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VOLUME VI.

GRAPHOPHONE PATENTS.

764,196 - 808,387.

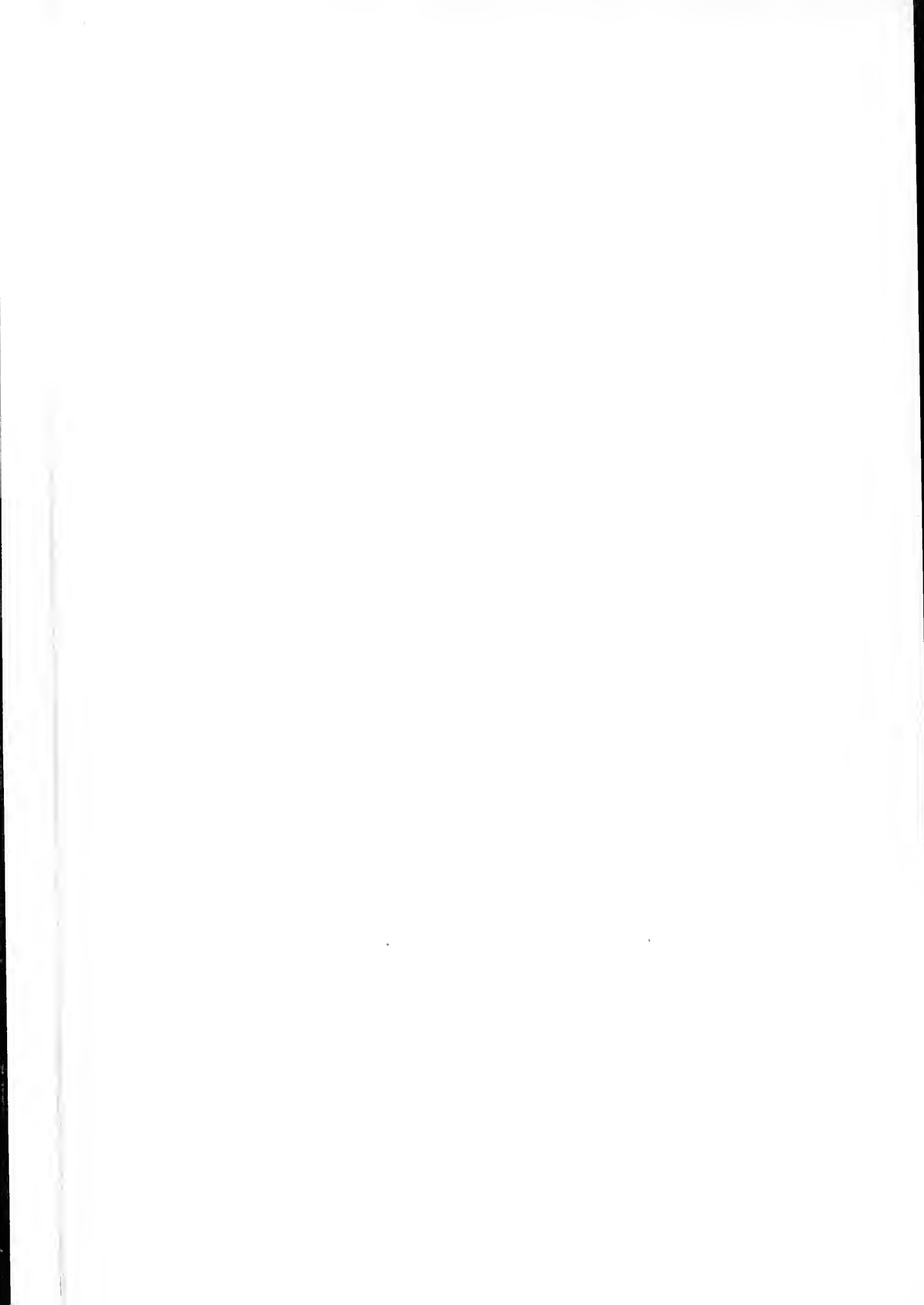
Adkins & Emery,	781,137;
Aiken, Ed. L.	775,591;
" " "	798,087;
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Asam, Wilhelm	801,634;
Aylsworth, J. W.	782,375;
Aylesworth & Miller,	764,196;
" " "	781,893;
Beatty, Joseph E.	787,264;
Berliner, Herbert S.	785,191;
Birnbaum, T.	768,728;
Bryant, Niles	802,135;
Bongiorno & Ruggiero,	770,024;
Capps & Emerson	733,420;
Capps, E., M., & N.	785,316;
" " "	785,317;
Cheney, George K.	783,176;
Cole, Arthur W.	778,305;
Conger & Eichhorn	798,876;
Connolly, Thomas A. & J. B.	775,532;
Conze, Albert	800,987;
Crabb, Earl L.	794,786;
Cunnius, Alfred R.	784,385;

m (S.S. Patent 19148) P.T. New York Co. 12 May 50 L.H.

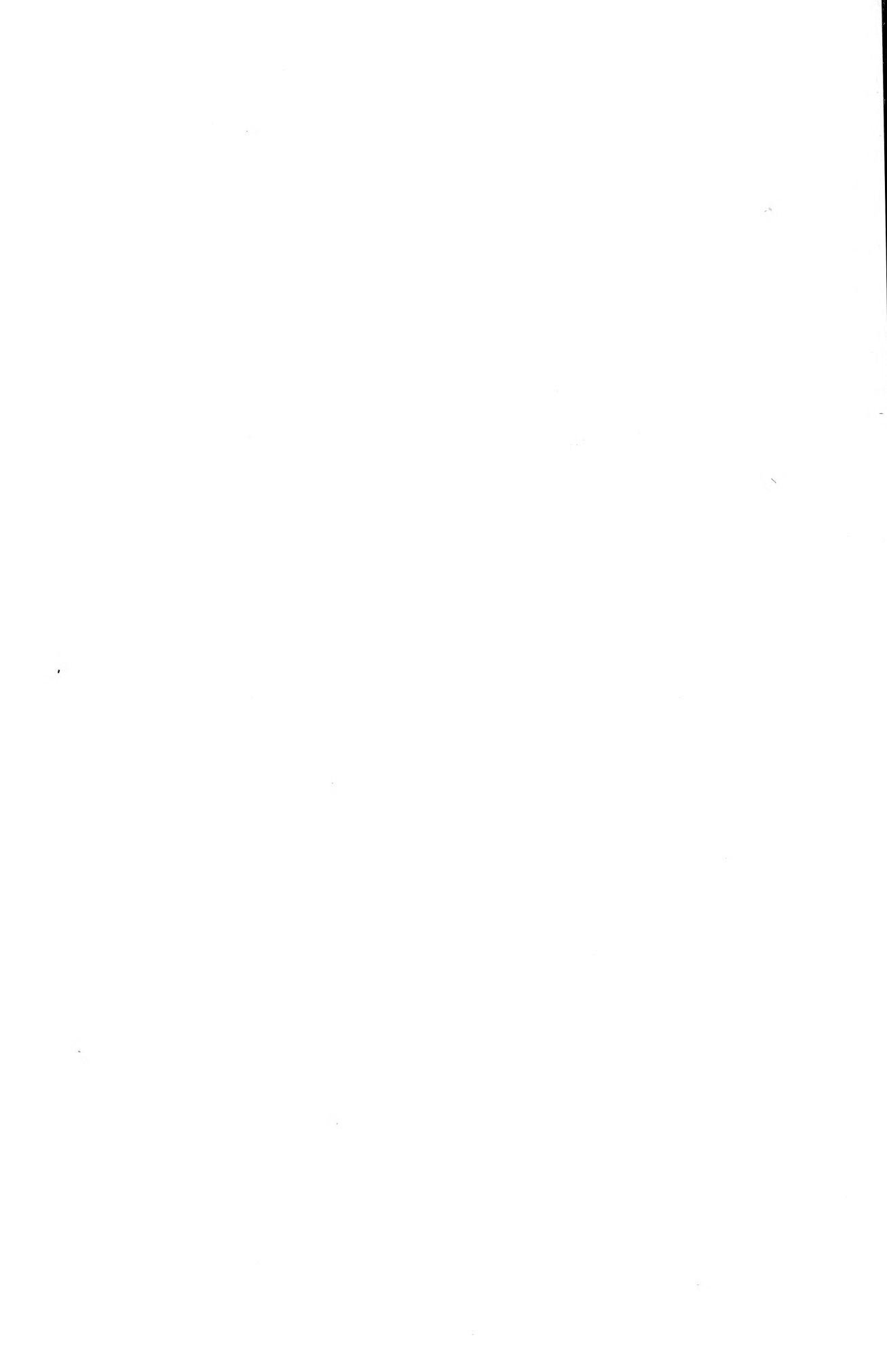
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Darby, William S.	786,347;	✓
Dennison, W. N.	765,462;	✓
Devineau, Lanis	784,603;	✓
Dickerson, Ed. N.	794,592;	✓
Dodd, David A.	783,934;	✓
Douglass, Leon F.	779,030;	✓
Dubinski, Benj.	773,486;	✓
Dunton, John C.	797,102;	✓
Durand, Nelson C.	794,599;	✓
Edison, T. A.	767,216;	✓
" " "	790,351;	✓
" " "	800,800;	✓
Eichhorn, Chas. J.	779,033;	✓
" " "	797,724;	✓
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Eichhorn & Conger	798,876;	✓
Emerson, V. H.	777,615;	✓
" " "	785,723;	✓
Emerson & Capps	783,420;	✓
Emerson, C., M., & H.	785,316;	✓
" " " "	785,317;	✓
8 - Emery & Adkins	781,137;	✓
English, John C.	766,141;	✓
Ensign, Harry	781,195;	✓
Farb, Solomon	805,417;	✓
Feist & Kretzer	805,737;	✓
Finch, Ed. B.	783,512;	✓
Fischer, Alex	793,778;	✓



Fletcher, Elmer	804,714;	✓
Foster, Frank H.	799,898;	✓
Gibson, R. J.	801,979;	✓
Gilbert, Elam	786,341;	✓
Gember, George W.	798,054;	✓
" " "	805,011;	✓
Hassett, Frank C.	780,171;	✓
Haug, Andrew	777,629;	✓
Haverman, William	806,806;	✓
Head, Robert	805,544;	✓
Heydebrand & Le Mon	778,543;	✓
Hibbard, Chas. L.	793,442;	✓
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Higson, Daniel	772,958;	✓
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" "	803,052;	✓
Hilgenberg, Conrad	799,085;	✓
Hill, Charles E.	773,740;	✓
Hood, Del. J.	787,625;	✓
Huse, Harry P.	767,342;	✓
" "	767,343;	✓
Irish, Albert L.	797,516;	✓
Inakson, John	804,604;	✓
Ivatts, E. A.	787,735;	✓
Jetter, Julius	776,183;	✓
" "	805,964;	✓



Johnson, E. R.	774,435;
" " "	778,492;
" " "	778,975;
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Johnson, H. W.	769,696;
Johnson & Moore	773,220;
Keller, Alfred	780,506;
Kershaw, Samuel	805,076;
King, Chas. R.	605,077;
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Konigstein, Gabor	792,720;
" " "	804,477;
Kretzer & Feist	805,787;
Kuhn, Harry H.	786,449;
Kurtz, C. J.	808,387;
Laudet, George	782,146;
Le Mon & Heydebrand	778,543;
Lewis, Nathan L.	774,482;
Lochmann, F. & W.	778,871;
Lutz, Julius H.	905,923;
Mc Kulty, H. B.	776,672;
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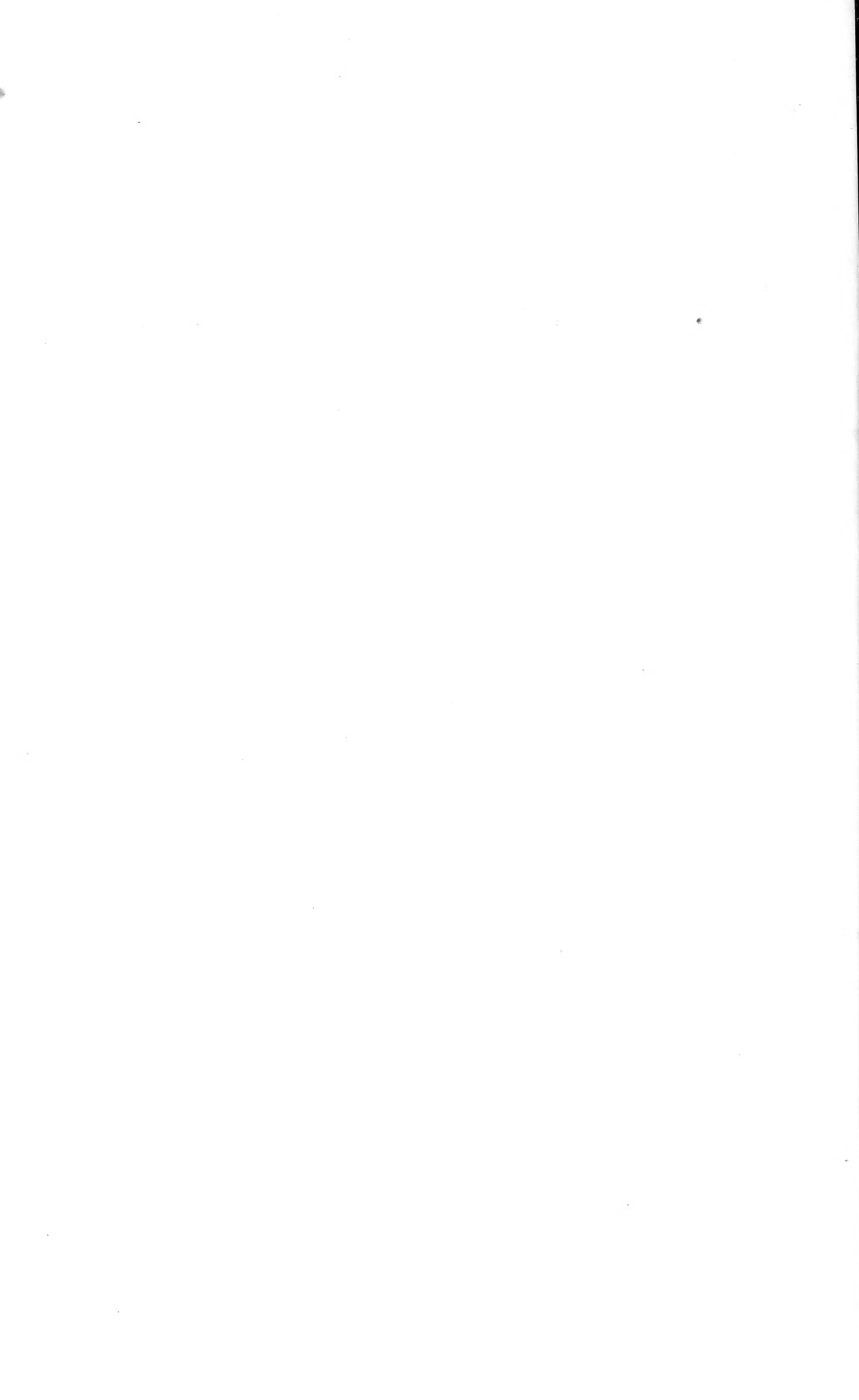
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Milette, Felix A.	798,816;	✓
Miller, Henry C.	793,012;	✓
Miller, Henry C.	793,013;	✓
Miller, W. H.	788,927;	✓
Miller & Aylesworth	764,196;	✓
" " "	781,893;	
Miller & Pierman	771,880;	
" " "	785,319;	✓
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✓ - Millet & Mundy	787,854;	✓
Mills, Herbert S.	797,813;	
Moore, G. A.	764,748;	
Moore & Johnson	773,290;	✓
Morgan, Harry E.	776,194;	
✓ - Mundy, Arthur J.	768,567;	
Murphy, F. M.	De. 37,661;	
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✓ - Mundy & Millet	787,854;	✓
Myers, Frederick	793,627;	✓
Neumann, Julius J.	771,564;	
Nielsen, Peter C.	771,441;	



Horton, C., E., & M.	785,316;	✓
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Noyes, Charles W.	774,100;	✓
O'Connor, M. J.	769,448;	-
Ott, John F.	790,857;	✓
Paxton & Shigley	800,331;	✓
Petit, A. N.	766,115;	✓
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Pfleger, F. P.	807,862;	✓
Piccinini, A.C.	804,264;	✓
Pierman & Miller	771,880;	✓
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Pruden, Lanis T.	798,330;	✓
Rapke, Victor H.	806,289;	
Rawlinson, C. J.	777,306;	✓
Rector, Enoch J.	797,020;	✓
Reynard, James K.	776,941;	✓
Rinehart, B. L.	788,281;	-
Robertson, George	764,868;	✓
Robinson, E. N.	778,271;	-
Rose, Harm C.	765,635;	✓
Ruggeriero & Bongiorno,	770,024;	✓
Sanders, Joseph	785,766;	✓
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Sanderson, John	773,344;	✓



2- Schiessler, Josef	772,676;	✓
Schmurkin, Iwan	776,554;	✓
Shigley, Cyrus C.	772,264;	✓
Shigley & Faxton	800,871;	✓
Smith, Richard B.	752,412;	✓
Steinberger, Louis	766,543;	✓
3- Sutherland, John,	796,540;	✓
Thomas, A. B.	825,028;	✓
Tiedell, A. G.	768,522;	✓
Valiquet, Louis P.	780,246;	✓
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Van Mater, John H.	804,903;	✓
Van Valkenburg, P. B.	773,304;	✓
Walker, Edwin	87 ,600;	✓
Weber, Peter	771,851;	✓
" "	770,542;	✓
" "	800,880;	✓
Weber & Hibbard	772,485;	✓
Webster, George	739,122;	✓
Wellner, Julius	766,561;	✓
" "	789,827;	✓
Wiechers, Albert C.	730,546;	✓
Wurth, Charles M.	771,758;	✓
Wurth, Albert F.	773,617;	✓
4- Zellers, Claude M.	786,395.	✓





No. 764,196.

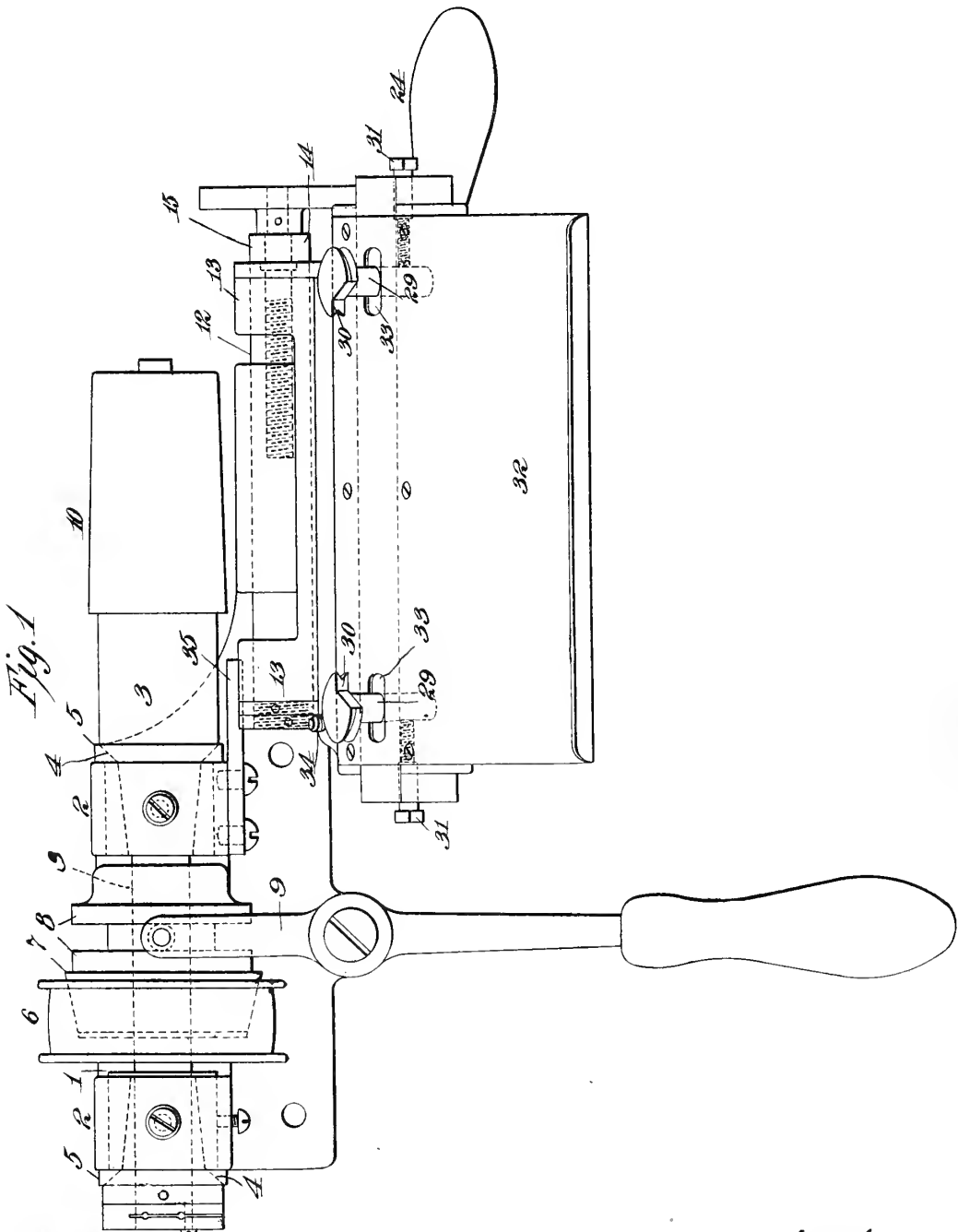
PATENTED JULY 5, 1904.

W. H. MILLER & J. W. AYLSWORTH.
EDGING MACHINE FOR PHONOGRAPH RECORDS.

APPLICATION FILED MAR. 13, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

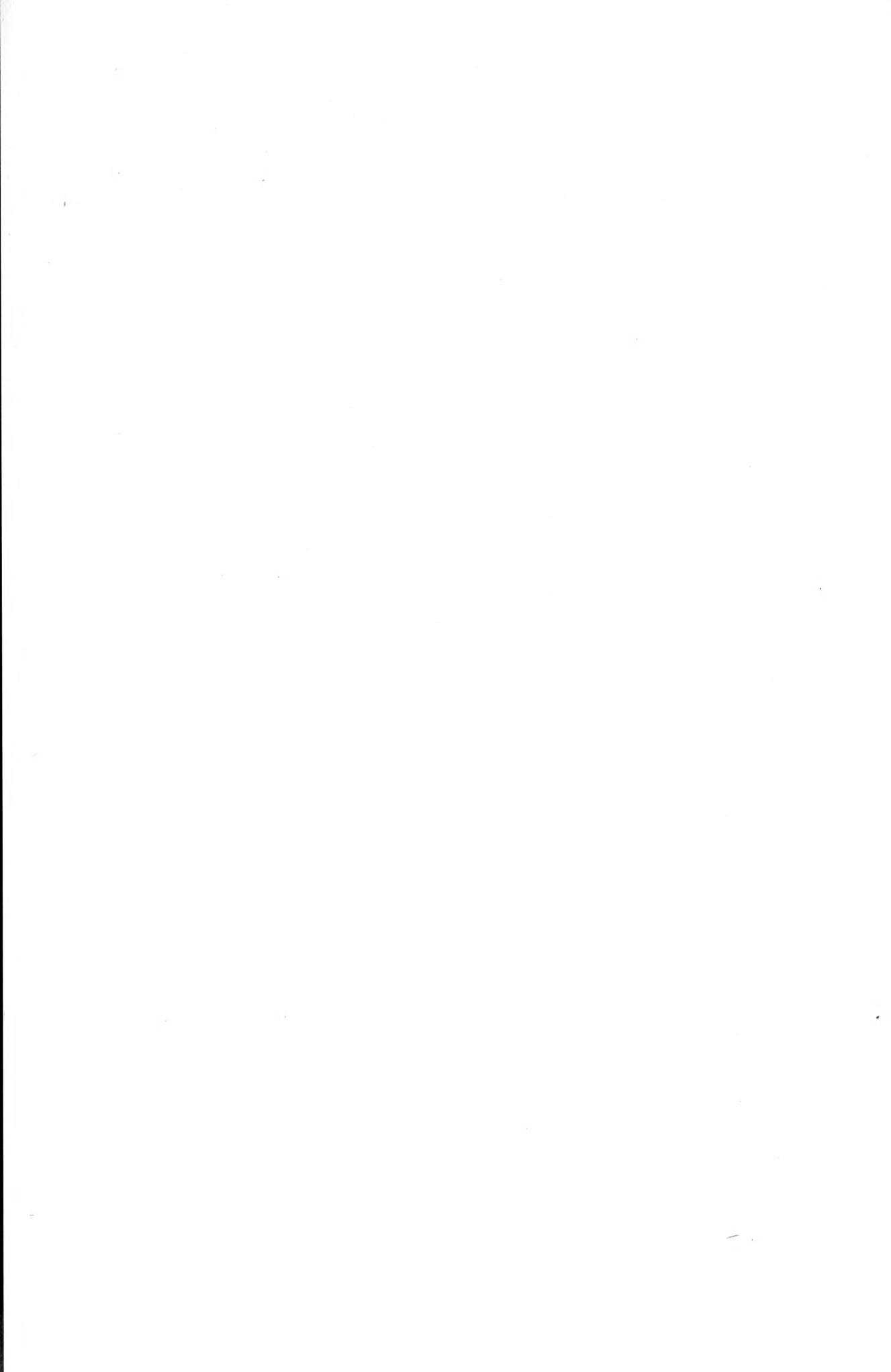


Witnesses:

Jas. F. Coleman
Geo. Robt Taylor

Inventors

Walter H. Miller
John W. Aylsworth
by *[Signature]*
Attorneys



W. H. MILLER & J. W. AYLSWORTH.
EDGING MACHINE FOR PHONOGRAPH RECORDS.

APPLICATION FILED MAR. 13, 1903.

NO MODEL.

3 SHEETS—SHEET 2.

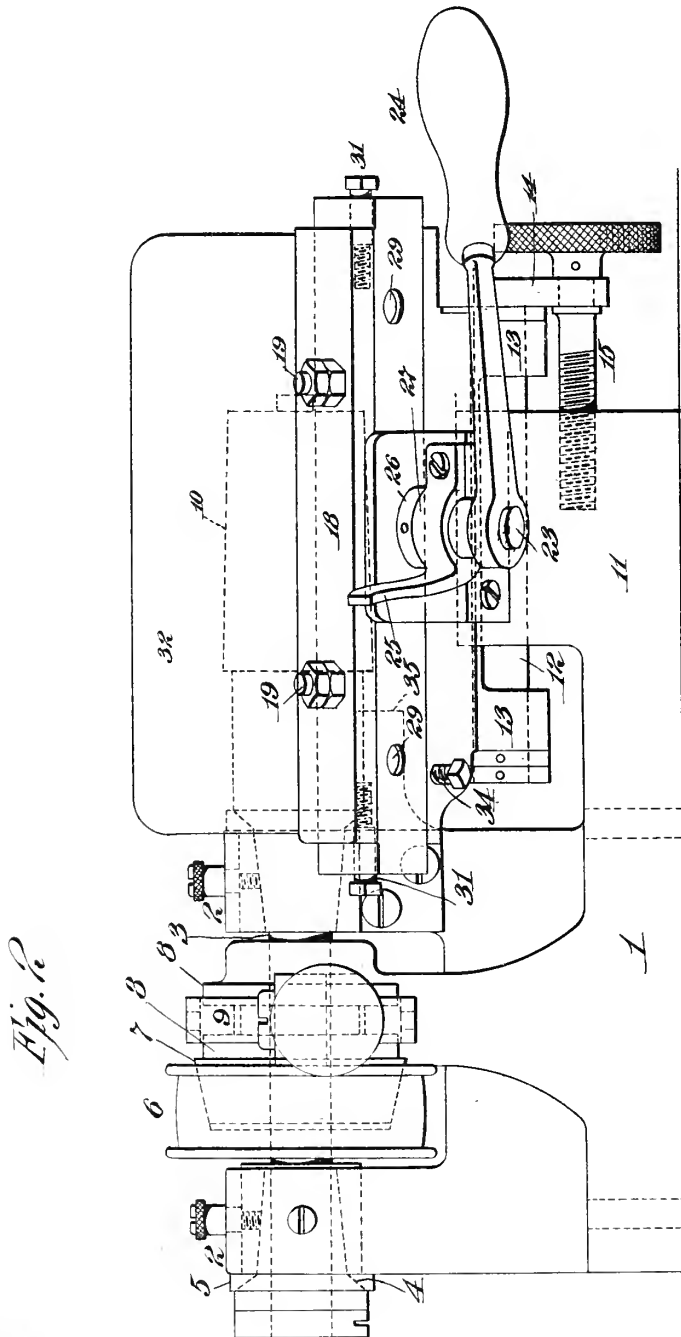


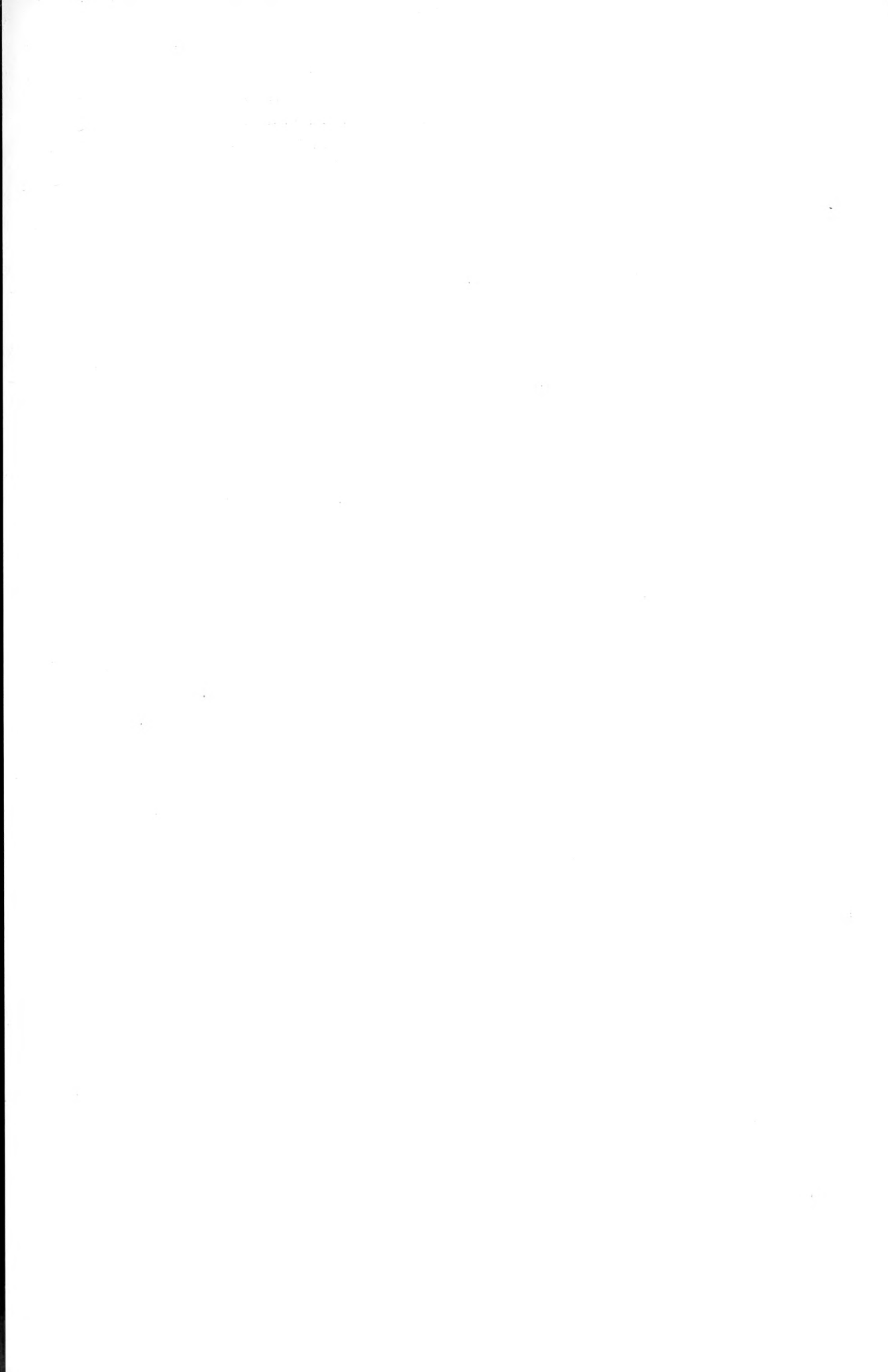
Fig. 2

Witnesses:

Jas. F. Coleman
Geo. Robt Taylor

Inventors:

Walter H. Miller
Jonas W. Aylsworth
 by *Agnes M. ...*
 Attorneys



W. H. MILLER & J. W. AYLSWORTH.
EDGING MACHINE FOR PHONOGRAPH RECORDS.

APPLICATION FILED MAR. 13, 1903.

NO MODEL.

3 SHEETS—SHEET 3.

Fig. 3

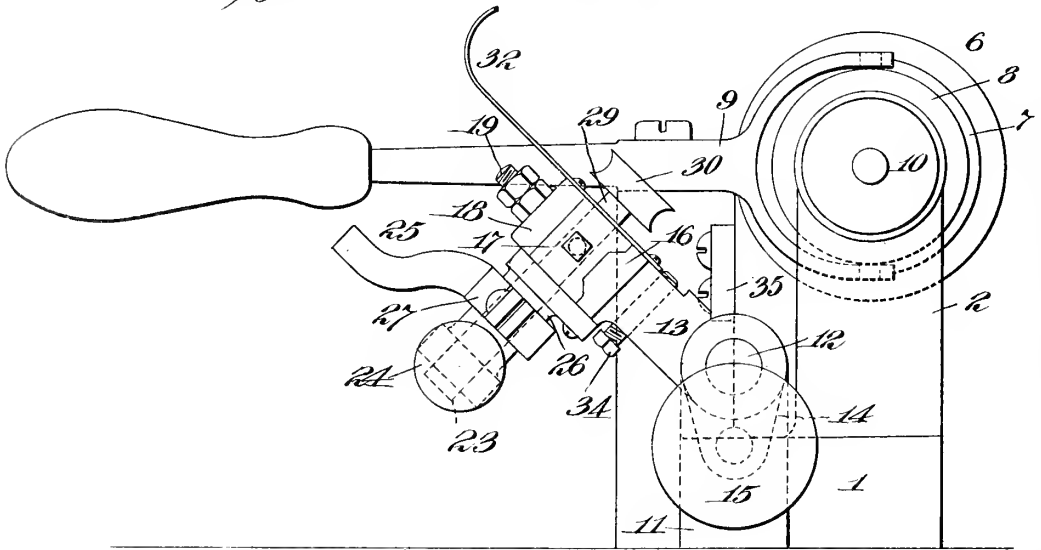
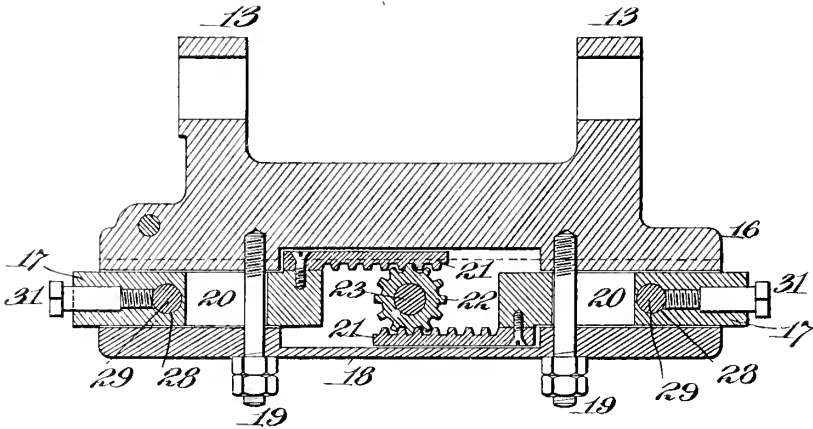


Fig. 4



Witnesses:

Jas. F. Coleman
Geo. Robt Taylor

Inventors

Walter H. Miller
Jonas W. Aylsworth
by Alvin S. [unclear]
Attorneys

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNORS, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

EDGING-MACHINE FOR PHONOGRAPH-RECORDS.

SPECIFICATION forming part of Letters Patent No. 764,196, dated July 5, 1904.

Application filed March 13, 1903. Serial No. 147,607. (No model.)

To all whom it may concern:

Be it known that we, WALTER H. MILLER, residing at Orange, and JONAS W. AYLSWORTH, residing at East Orange, in the county of Essex and State of New Jersey, both citizens of the United States, have invented a certain new and useful Improvement in Edging-Machines for Phonograph-Records, of which the following is a specification.

Our invention relates to an improved machine for trimming the edges of phonograph-records, and particularly duplicate phonograph-records made by a casting or allied process in a mold. With such duplicate record it is inexpedient to properly mold more than one of its ends, and when a dipping process is used, as we describe in our Patent No. 683,615, dated October 1, 1901, both ends of the duplicate are left unfinished and require to be trimmed to form.

Our improved machine has been designed especially for the edging of duplicate records made by our process; but obviously the machine can be employed in connection with phonograph-records obtained in other ways or in connection with blanks.

Our object is to provide a simple and efficient machine for the purpose.

In order that our invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a plan view of the machine, showing the cutters in their retracted position away from the record; Fig. 2, a side view of the same; Fig. 3, an end view showing in dotted lines the position of the cutters in engagement with the record, and Fig. 4 a sectional view of the swinging cutter-carrying frame.

In all of the above views corresponding parts are represented by the same numerals of reference.

The base 1 is formed with two bearings 2 2, in which is mounted a shaft 3. The shaft is formed with shoulders 4, which take against thrust-collars 5 5, so as to prevent longitudi-

nal movement of the shaft. Mounted on the shaft 3 is a loose pulley 6, to which power is applied. This pulley constitutes one element of a friction-clutch, the other or cone element, 7, being formed with collars 8 8 and being splined to the shaft 3. A forked lever 9 operates the cone 7 to engage the same with the pulley 6 when the shaft is to be rotated. The shaft is provided or formed with a tapered mandrel 10 for receiving the record or blank.

The base 1 is formed with an extension 11, in which is mounted a rock-shaft 12. Mounted upon this rock-shaft are ears 13, formed on the cutter-carrying frame. The latter frame is provided with a downwardly-extending lug 14, through which extends an adjusting-screw 15, engaging within the base 1, whereby the turning of the adjusting-screw will adjust the cutter-carrying frame longitudinally with respect to the mandrel 10. The cutter-carrying frame is formed with a projecting rib or bead 16, on which are mounted blocks 17, held in position by a top plate 18 and by bolts 19, passing through slots 20 in the two blocks. These blocks are provided with racks 21, which diametrically engage a pinion 22 on a shaft 23. On the end of this shaft is a lever 24 for partially rotating the same. In order to limit the operative movement of the lever 24, we make use of a stationary stop 25, secured in place to the bearing 26 of the shaft 23 by a split collar 27, whereby said stop may be adjusted. The blocks 17 are formed with openings 28, which receive the shanks 29 of cutters 30 of the proper shape. These cutters, as shown, are made preferably circular in form, so that as they become dulled they may be cut away to present fresh surfaces to the wax-like material and will require merely a radial adjustment to bring the sharpened edge again in the proper relation to the record. The cutters or knives 30 are maintained rigidly in position within the blocks 17 by clamping-screws 31. In order to prevent fine particles of the wax-like material from being projected up-

wardly, so as to inconvenience the operator, we provide the cutter-carrying frame with a shield 32, formed with slots 33 therein, in which the shanks of the cutters work. The swinging movement of the cutters toward the record or blank is limited by an adjusting-screw 34 passing through the cutter-carrying frame and adapted to come into engagement with a lug 35, secured to one of the bearings 2, as shown.

The operation of our improved edging-machine is as follows: The friction-clutch being released and the mandrel 10 being stationary, the blank or record is inserted over the latter and frictionally engaged therewith, after which the lever 24 is operated to engage the friction-cone 7 with the pulley 6, through which power is applied, whereby the record or blank will be rotated at high speed. The handle 24 is now grasped and without being moved to turn the shaft 23 is merely elevated to swing the cutters toward the rotating blank or record until the adjusting-screw 34 engages the stop 35. In this position the cutters are in proper line to operate on the article. The handle 24 is now swung radially, so as to turn the shaft 23, causing the pinion 22 to advance the cutters toward each other into simultaneous engagement with both edges of the record or blank. The latter rotating at high speed will have its edges smoothly and cleanly trimmed, according to the form of the cutters. When the records or blanks are of standard length and diameter, no special adjustment of the cutters with respect to the same requires to be made when the cutters are once adjusted by the adjusting-screw 15. If, however, the record varies in length or in its position on the mandrel, due to any variations in its diameter, the adjusting-screw 15 may be operated so as to shift the cutters longitudinally with respect to the record or blank in one direction or the other until the proper relation between the two is secured.

Having now described our invention, what we claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In an edging-machine of the character described, the combination with a rotating mandrel, of a non-rotating cutter, means for laterally moving the cutter and mandrel relatively to each other, and means for longitudinally moving the cutter and mandrel relatively to each other, the cutter when in its operating position presenting one portion of its cutting edge substantially parallel to the axis of the mandrel, and another portion of its cutting edge extending inward from said first portion toward the body of the mandrel, substantially as set forth.

2. In an edging-machine of the character described, the combination with a rotating mandrel, of a pair of non-rotating cutters, means for effecting a relative lateral movement of the cutters and mandrel, and means for effect-

ing a relative longitudinal movement of the cutters and mandrel, the cutters when in their operating position presenting one portion of their cutting edges substantially parallel to the axis of the mandrel, and another portion of their cutting edges extending inward from said first portion toward the body of the mandrel, substantially as set forth.

3. In an edging-machine of the character described, the combination with a rotating mandrel, of a pair of non-rotating cutters, means for simultaneously moving said cutters toward and away from each other, and means for moving the cutters laterally toward and away from the mandrel, the cutters when in their operating position presenting one portion of their cutting edges, substantially parallel to the axis of the mandrel, and another portion of their cutting edges extending inward from said first portion toward the body of the mandrel, substantially as set forth.

4. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame pivoted to swing laterally with respect to the same, a non-rotating cutter carried by said frame, means for moving the cutter longitudinally with respect to the mandrel, and a single handle for swinging said frame on its pivot and operating said means, substantially as set forth.

5. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame pivoted to swing laterally with respect to the mandrel, a pair of non-rotating cutters carried by the frame, and means for moving said cutters toward and away from each other longitudinally with respect to the mandrel, substantially as set forth.

6. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame pivoted with respect to the mandrel and swinging laterally toward and away from the same, means for adjusting the frame longitudinally of the mandrel, a non-rotating cutter carried by the frame, and means for moving the cutter longitudinally with respect to the mandrel, substantially as set forth.

7. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame pivoted to swing laterally with respect to the mandrel, means for adjusting the frame longitudinally of the mandrel, a pair of non-rotating cutters carried by the frame, and means for simultaneously moving said cutters toward and away from each other longitudinally of the mandrel, substantially as set forth.

8. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame pivoted to swing laterally with respect to the mandrel, adjustable means for limiting its lateral movement, a non-rotating cutter carried by the frame, and means for

moving said cutter longitudinally of the mandrel, substantially as set forth.

9. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame pivoted to swing laterally with respect to the mandrel, adjustable means for limiting the lateral movement of said frame, means for adjusting the frame longitudinally of the mandrel, a non-rotating cutter carried by the frame, and means for moving said cutter longitudinally with respect to the mandrel, substantially as set forth.

10. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame pivoted to swing laterally with respect to the mandrel, adjustable means for limiting the lateral movement of said frame, means for adjusting the frame longitudinally of the mandrel, a non-rotating cutter carried by the frame, means for moving said cutter longitudinally with respect to the mandrel, and means for limiting the longitudinal movement of said cutter, substantially as set forth.

11. In an edging-machine of the character described, the combination with a rotating mandrel, of a swinging frame movable laterally with respect to the mandrel, a cutter carried by said frame, and a shield inclosing said cutter, substantially as set forth.

12. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame movable laterally with respect to the mandrel, a non-rotating cutter carried by said frame, and means for moving said cutter longitudinally of the mandrel, the cutter when in its operating position presenting one portion of its cutting edge substantially parallel to the axis of the mandrel, and another portion of its cutting edge extending inward from said first portion toward the body of the mandrel, substantially as set forth.

13. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame movable laterally with respect to the same, a pair of non-rotating cutters carried by the frame, and means for simultaneously moving said cutters toward and away from each other longitudinally of the mandrel, the cutters when in their operating position presenting one portion of their cutting edges substantially parallel to the axis of the mandrel, and another portion of their cutting edges extending inward from said first portion toward the body of the mandrel, substantially as set forth.

14. In an edging-machine of the character

described, the combination with a rotating mandrel, of a frame pivoted to swing laterally toward and away from the same, a pair of slide-blocks carried by said frame, a non-rotating cutter mounted in each block, means for simultaneously moving said slide-blocks toward and away from each other, and a single handle for swinging said frame on its pivot and operating said means, substantially as set forth.

15. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame pivoted to swing toward and away from the same, a slide-block in said frame, a non-rotating cutter adjustably mounted in said slide-block, means for moving the slide-block longitudinally of the mandrel, and a single handle for swinging said frame on its pivot and operating said means, substantially as set forth.

16. In an edging-machine of the character described, the combination with a rotating mandrel, of a frame movable laterally with respect to the same, carrying a circular non-rotating cutter having a recess whose edges form cutting edges within the body of the cutter, and means for moving said cutter longitudinally of the mandrel, substantially as set forth.

17. In an edging-machine of the character described, the combination with a rotatable mandrel and a friction-clutch for connecting the same with a source of power, of a frame pivoted to swing laterally with respect to the mandrel, a non-rotating cutter carried by the frame, means for moving said cutter longitudinally of the mandrel, and a single handle for swinging said frame on its pivot and operating said means, substantially as set forth.

18. In an edging-machine of the character described, the combination with a rotatable mandrel and a friction-clutch for connecting the same with a source of power, of a frame pivoted to swing laterally with respect to the mandrel, a pair of non-rotating cutters carried by said frame, means for simultaneously moving said cutters with respect to the mandrel, and a single handle for swinging said frame on its pivot and operating said means, substantially as set forth.

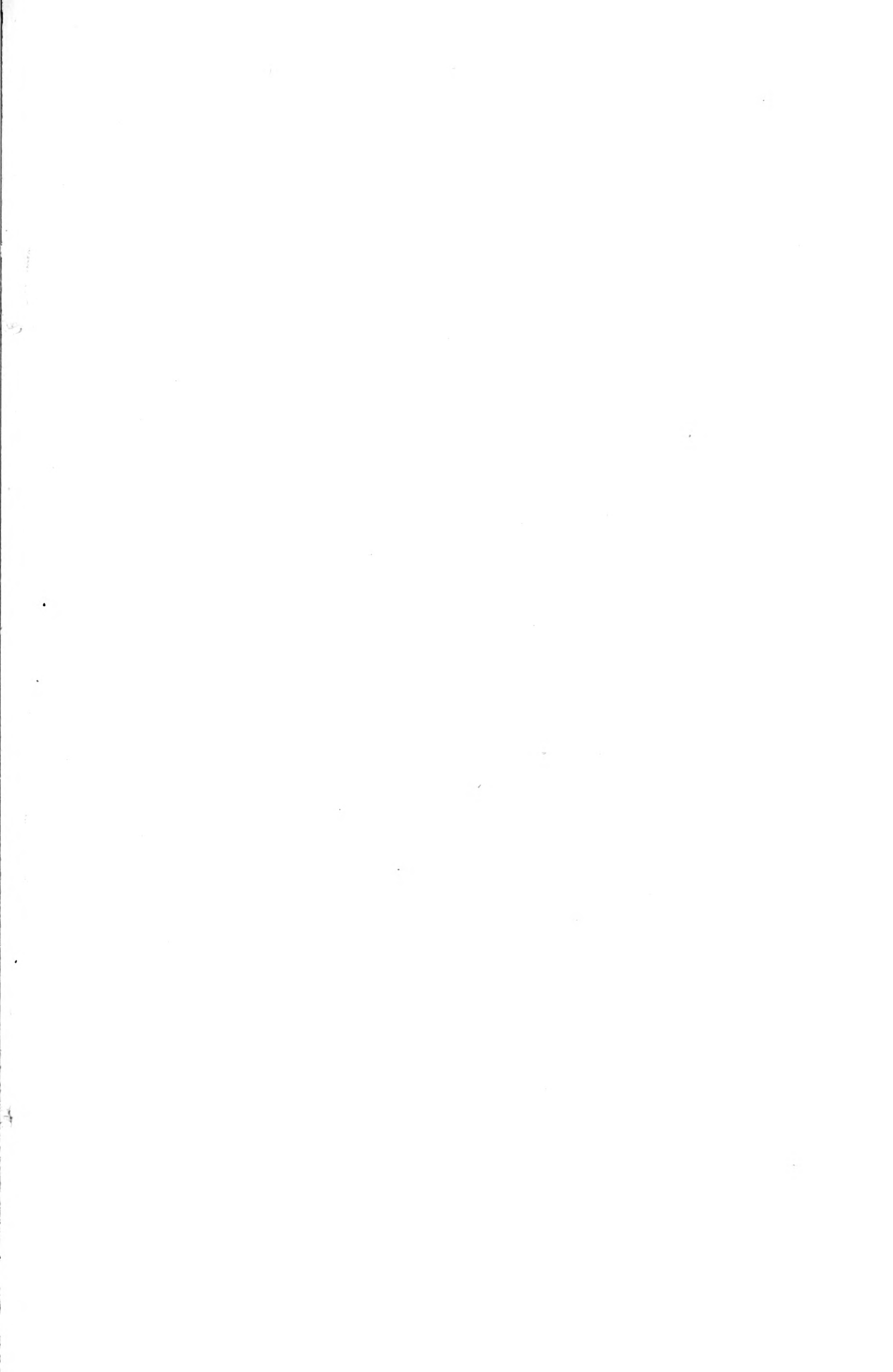
This specification signed and witnessed this 9th day of March, 1903.

WALTER H. MILLER.
JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
JNO. ROBT. TAYLOR.



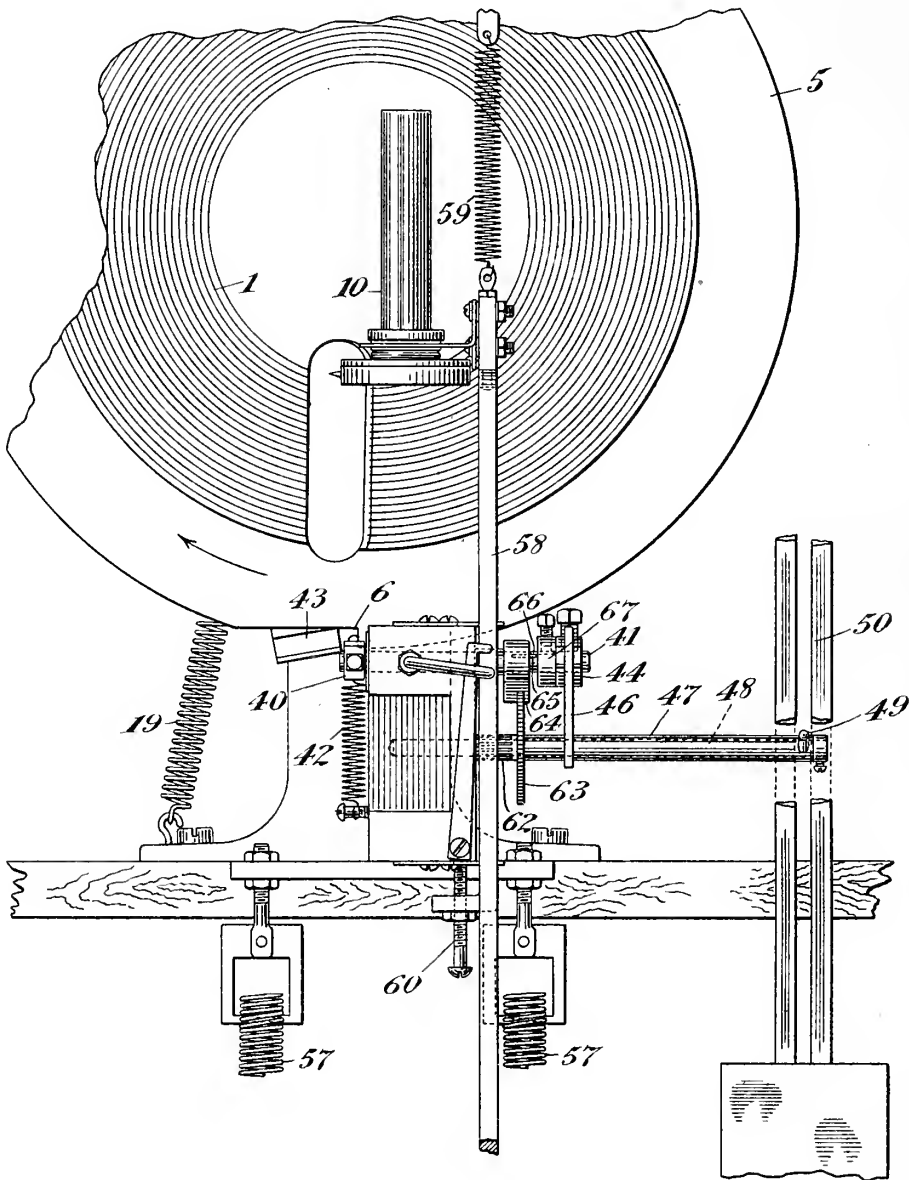


G. A. MOORE.
ANNOUNCING MACHINE.
APPLICATION FILED AUG. 19, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

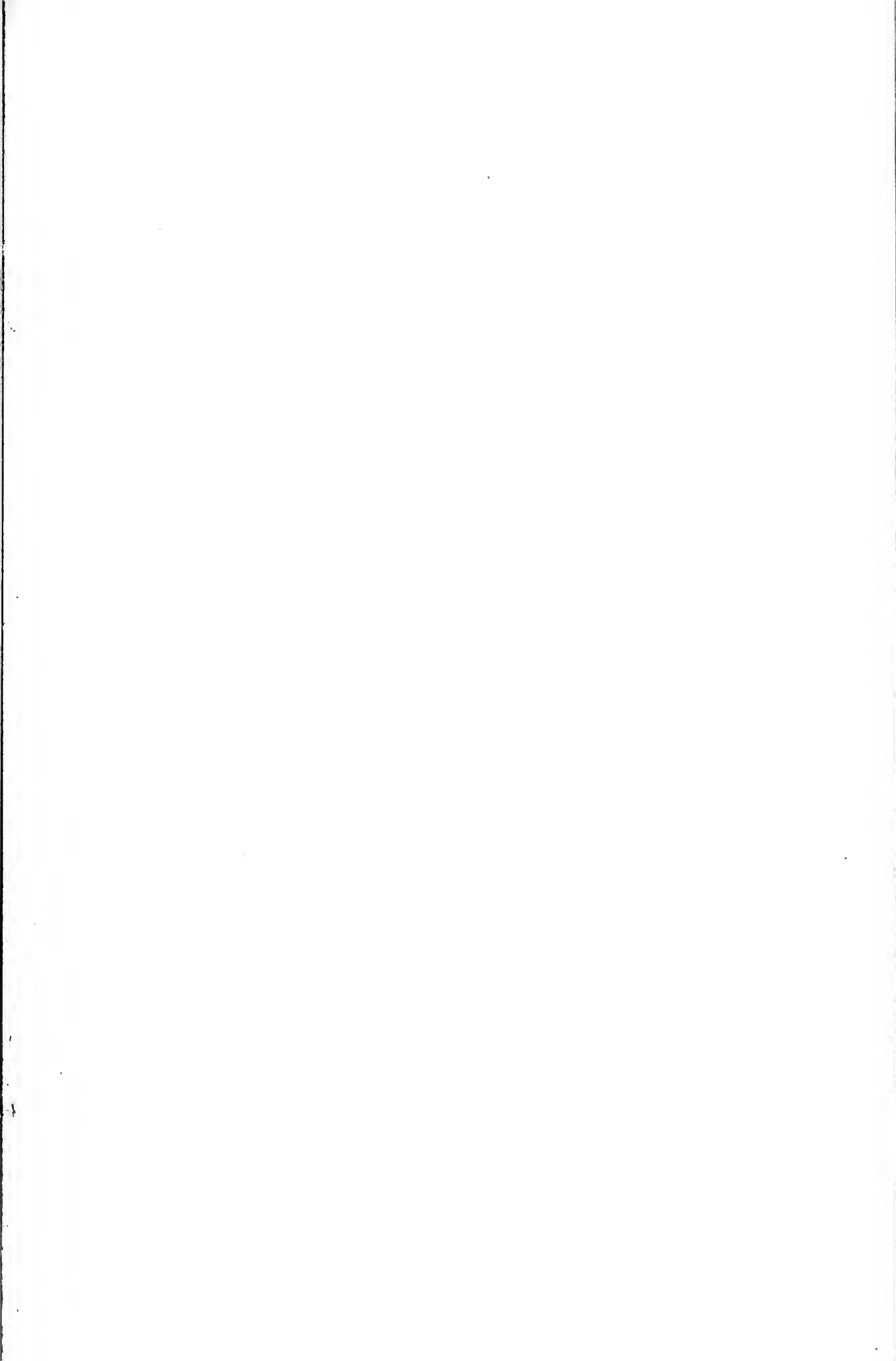


Witnesses:

Martin Roberts
Lucius Varney

Inventor:

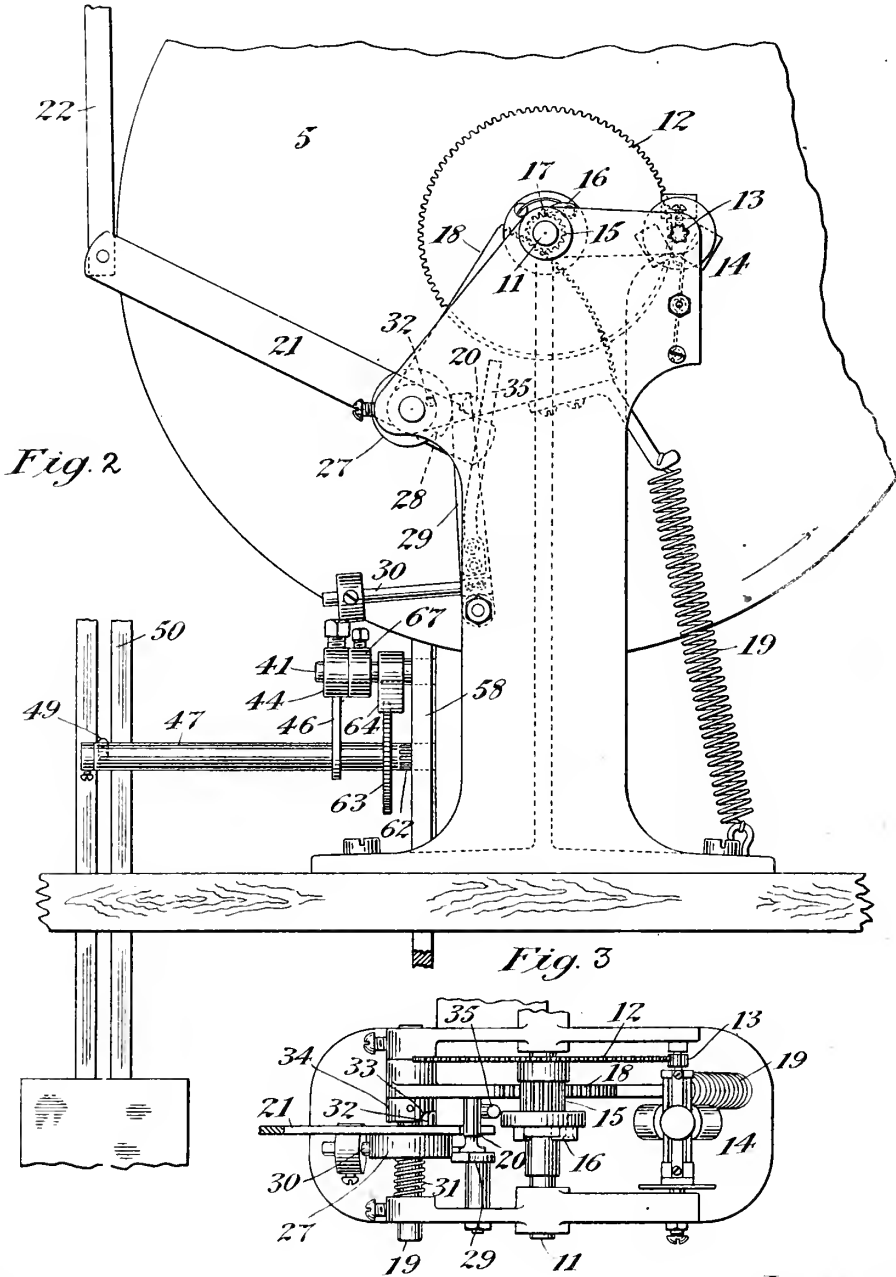
George A. Moore
By Redding, Kiddle & Freely
Attys.



G. A. MOORE.
ANNOUNCING MACHINE.
APPLICATION FILED AUG. 19, 1903.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:
Martin Roberts
Lucius Varney

Inventor:
George A. Moore
By Redding Kiddle Greeley
Attys.

UNITED STATES PATENT OFFICE.

GEORGE ALBERT MOORE, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN TALKING SCALE COMPANY, OF AUGUSTA, MAINE, A CORPORATION OF MAINE.

ANNOUNCING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 764,748, dated July 12, 1904.

Application filed August 19, 1903. Serial No. 169,983. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ALBERT MOORE, a citizen of the United States, residing in the borough of Manhattan, in the city of New York, in the State of New York, have invented certain new and useful Improvements in Announcing-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to machines of the general character of that shown in Letters Patent of the United States No. 718,500, dated January 13, 1903, in which some one of a previously-prepared series of announcements is expressed through the operation of suitable mechanism, which may be actuated by the weight or height of a person or other means and may be rendered operative, if desired, by a coin-controlled device.

The object of the present invention is to simplify and improve in various particulars the construction and operation of machines of the character referred to, as more particularly explained hereinafter with reference to the accompanying drawings, in which, for the purposes of such explanation, a convenient and practical embodiment of the invention is illustrated.

In said drawings, Figures 1 and 2 are views in front elevation and rear elevation, respectively, showing those portions of the mechanism of a phonographic weight-announcing or weighing machine in which the invention is more particularly concerned. Fig. 3 is a plan view of some of the parts shown in Fig. 2.

In the embodiment of the invention illustrated in the drawings the machine is adapted to give audible expression to a weight imposed upon a scale-platform, as the weight of an individual who may stand thereon, a previously-prepared phonographic record, having impressed thereon a series of weight announcements being arranged to be brought into operative relation with a sound-reproducer, while the selection of the particular weight-announcement with which the reproducer is brought into operative relation is determined by relative movement of the record and the reproducer under the influence of the weight on the

scale-platform, and provision is made whereby the machine, normally locked against operation, shall be brought into operation through the action of a coin-controlled device. In this machine the phonographic record 1, supported upon a plate 5, and the phonographic sounder or reproducer 10 may be arranged and operate as shown and described in said Letters Patent No. 718,500. The record-plate 5 is fixed upon a shaft 11, which is mounted in suitable bearings supported by the frame of the machine, said shaft also bearing a gear 12 for engagement with a pinion 13 of a suitable governor 14, which may be constructed as shown in Letters Patent of the United States No. 702,985, dated June 24, 1902. Loosely mounted on the shaft 11 is a pinion 15, which carries a spring-pressed pawl 16, adapted to engage a notch 17 in the shaft 11, whereby the pinion 15 rotates the record-plate with it when moving in one direction and moves idly on the shaft in the opposite direction. The pinion 15 is engaged by a segment 18, which is moved in one direction by hand-operated devices and is returned in the opposite direction to impart rotation to the record-plate by suitable means, such as a spring 19. The gear-segment 18 is mounted loosely upon a fixed shaft 19 and carries a pin 20, which is engaged by a lever 21, also mounted on the shaft 19 and arranged to be operated by hand, being connected in the machine represented by a link 22 with a suitable handpiece. The link 22 is held normally in its elevated position by suitable means, such as a spring. (Not shown.) It will be understood that when the handpiece is depressed the gear-segment 18 is swung upon its bearing through the contact of the pin 20 with the end of the lever 21, the pawl 16, which is carried by the pinion 15, then moving idly over the notch 17 in the shaft 11; but when the segment is released by the spring 19 the pawl then engages the notch or shoulder on the shaft 11 and the record-plate receives a complete rotation. To insure complete movement of the handpiece, the hub 27 of the lever 21 is provided with a notch 28, (shown in dotted lines in Fig. 6,) which is adapted to

be engaged when the lever has been moved the required distance by a latch 29, which may be pressed normally toward the hub 17 by a suitable counterweighted arm 30. The arm 5 21 and its hub 27 are movable longitudinally upon the fixed shaft 19 against a suitable spring 31, and the hub or the lever carries a projecting stud 32, which coöperates with a cam 33, formed on a collar 34, fixed to the 10 shaft 19 to thrust the lever 21 away from the collar 34 as the lever approaches the limit of its proper movement, and thereby to disengage the lever from the pin 20 of the segment 18. This device not only permits the 15 segment to be returned at the proper time independently of the movement of the hand-piece, but prevents excessive movement of the segment and breaking of the teeth of the segment or of the parts connected therewith 20 by reason of violent movement of the hand-piece. The lever 21 is held in its abnormal position by the latch 29, as described, until the segment 18 is released and returns to its normal position, when the pin 20, carried thereby, 25 makes contact with a finger-piece 35, secured to the latch 29, and throws the latch out of engagement with the notch 28 of the hub 27, permitting the lever and its connected parts to be returned to normal position by the spring 26. 30 The record-plate 5 is held until the proper time against rotation by the spring 19 by the engagement with a notch 6 in its edge of a detent 40, which is fixed upon a shaft 41, mounted in a suitable bearing carried by the 35 frame of the machine, and is held normally away from engagement with the record-plate by a suitable spring 42. A lifter-cam 43, carried by the record-plate 5, picks up the detent 40 as the record-plate completes its 40 rotation and brings it into engagement again with the notch or shoulder 6, where it is held by devices about to be described. On the shaft 41 is adjustably secured a collar 44, having a notch or shoulder 45 for engage- 45 ment by a spring-pressed latch 46, secured to a sleeve 47, mounted loosely on a fixed spindle 48, carried by the frame of the machine. The sleeve 47 is also provided with a finger 49, which is projected into the coin-chute 50, 50 so that when a coin falls through the chute and strikes the finger 49 the latch 46 will be disengaged from the shoulder 45 of the collar 44, and the shaft 41 will be permitted to turn under the influence of the spring 42, 55 and the detent 40 will thereby be disengaged from the record-plate 5 and the latter permitted to make one rotation under the influence of the spring 19.

In the machine shown in the accompanying 60 drawings, as in that shown in the above-mentioned Letters Patent of the United States No. 702,985, the reproducer 10 is movable with respect to the record 1 and is connected with the scale-platform through a link 65 drawn normally upward by counterbalancing-

70 springs 57 and an adjustable rod or bar 58, which is suitably guided in the frame of the machine and may be counterbalanced by a spring 59, having an adjustable stop 60 to limit its upward movement. As described 70 in said Letters Patent No. 702,985, the rod or bar 58 may be provided with rack-teeth to be engaged by a pinion, which is mounted loosely on the fixed spindle 48 and has secured thereto a ratchet-wheel 63. The latter 75 is engaged by a pawl 64, mounted loosely on the shaft 41 to thereby hold the bar 58, and therefore the reproducer 10, in the position determined by the weight on the scale-platform without possibility of vibration, which would 80 cause the stylus of the reproducer to injure the record when the latter has been set in motion. In the present case the pawl 64 is disengaged from the ratchet-wheel 63 by means which are somewhat different from the 85 means shown in said Letters Patent No. 702,985 and are better adapted to the changed organization of the machine. The hub of the pawl 64 is provided with a pin or projection 65 in the path of a similar projection 90 66 on a collar 67, which is secured to the shaft 41, so that when said shaft is rocked in one direction, as hereinbefore described, the pawl will be lifted from the ratchet-wheel to permit the necessary movement of 95 the reproducer; but when the shaft is rocked in the opposite direction to release the record-plate 5 the pawl is permitted again to engage the ratchet and thereafter hold the reproducer from movement. 100

In the operation of the machine shown in the drawings it will be understood that when a person stands upon the scale-platform the reproducer will thereby be moved with relation to the record to an extent determined by 105 the weight of the person. The hand-piece is then depressed to move the gear-segment 18 from its normal position of rest. The gear-segment is released from the lever 21, operated by the hand-piece as soon as the latter has 110 completed its movement, but is held from return in response to the tension of the spring 19 through the engagement of the pawl 16 on the pinion 15 with the shaft of the record-plate 5, which is still held by the detent 40. 115 The proper coin being introduced through the coin-slit and falling through the chute strikes the finger 49 and rocks the sleeve 47, thereby disengaging the latch 46 from the notch 45 of the collar 44 and permitting the 120 shaft 41 to be rocked by the spring 42 in a direction to release the record-plate. Just previous to the release of the plate 5 the stop 66 on the collar 67 moves away from the stop 65 on the pawl 64 and permits the latch to en- 125 gage the ratchet-wheel 63, thereby through the pinion 62 and the rack-teeth 61 holding the bar 58 and the reproducer 10 in the position determined by the weight of the person on the scale-platform. The release of the 130

plate 5 by the detent 40 permits the latter to receive a complete rotation through the return of the segment 18 by the spring 19, and as the rotation of the plate is completed the pick-up 43 again lifts the detent 40 into position to stop the further rotation of the record-plate. The lifting of the detent in this manner rocks the shaft 41 to an extent sufficient to permit the shoulder 45 to be engaged by the detent 46 and at the same time lifts the pawl 64 from the ratchet-wheel 63, again leaving the bar 58 and the reproducer 10 free to be moved at another operation. As the segment 18 returns to its normal position under the influence of the spring 19 its pin 20 acts upon the finger 35 to disengage the latch 29 from the hub 27 of the lever 21, thus permitting the handpiece to rise again to its normal position.

It will be understood that the improvements herein described are not restricted in their application to a machine for announcing weights, but are applicable to other machines of like general character—such, for example, as the height-measuring machine shown in said Letters Patent No. 718,500. It will also be understood that the details of construction and arrangement of the parts can be varied as may be necessary to adapt them to different machines without departing from the spirit of the invention.

I claim as my invention—

1. In a machine of the character described, the combination of a movable record, a reciprocating gear-segment, a device intermediate said gear-segment and record to effect movement of the record in one direction only through the reciprocation of the segment and means for reciprocating said segment, substantially as described.

2. In a machine of the character described, the combination of a movable record, a reciprocating gear-segment, a device intermediate said gear-segment and record to effect the movement of the record in one direction only through the reciprocation of the segment, an operating-lever for said segment and means to disengage said segment from said lever, substantially as described.

3. In a machine of the character described, the combination of a movable record, a gear-segment in operative relation therewith, an operating-lever adapted for engagement with said segment, and means to disengage said segment from said lever, substantially as described.

4. In a machine of the character described, the combination of a movable record, a reciprocating gear-segment in operative relation therewith and having a projecting pin, an op-

erating-lever mounted in proximity to said segment and adapted to engage said pin, and a fixed cam coöperating with said lever to move it out of engagement with said pin, substantially as described.

5. In a machine of the character described, the combination of a movable record, a reciprocating gear-segment in operative relation therewith, an operating-lever adapted for engagement with said segment, means to disengage said lever from said segment, a latch to hold said lever in abnormal position and means to disengage said latch, substantially as described.

6. In a machine of the character described, the combination of a movable record, a reciprocating gear-segment in operative relation therewith, an operating-lever adapted for engagement with said segment, means to disengage said lever from said segment, a latch to hold said lever in abnormal position, and means operated by said segment to disengage said latch, substantially as described.

7. In a machine of the character described, the combination of a movable record, a reciprocating gear-segment having a projecting pin, an operating-lever mounted concentrically with said segment for engagement with said pin and movable laterally from said segment and having a lateral projection, and a fixed cam coöperating with said projection to disengage said lever from said pin, substantially as described.

8. In a machine of the character described, the combination of a movable record, a reciprocating gear-segment, having a projecting pin, an operating-lever adapted for engagement with said pin, a latch adapted to hold said lever in abnormal position, and a finger-piece secured to said latch and arranged to coöperate with said pin to disengage said latch, substantially as described.

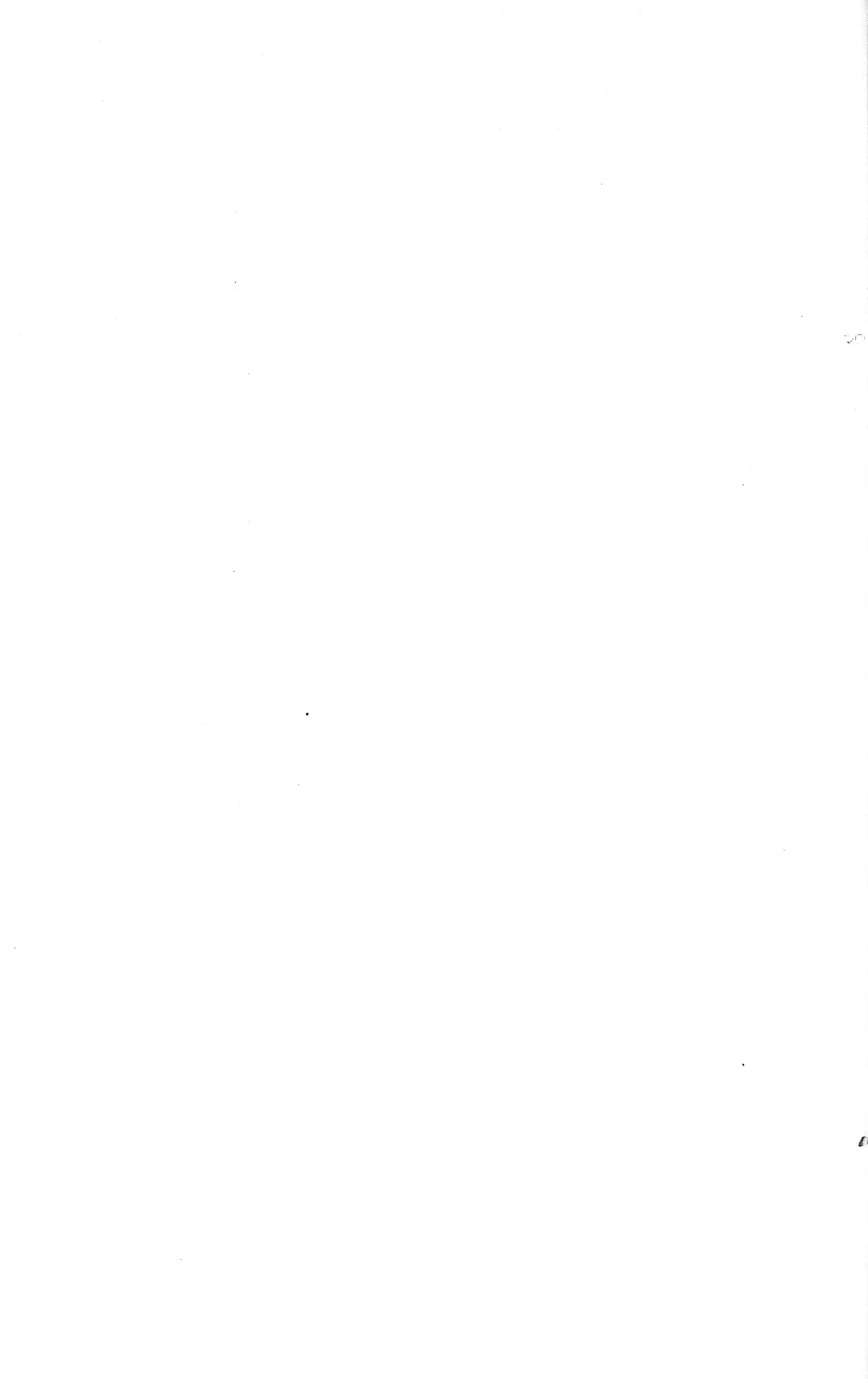
9. In a machine of the character described, the combination of a movable record, a reciprocating gear-segment having a projecting pin, an operating-lever mounted concentrically with said gear-segment for engagement with said pin and movable laterally, means to disengage said lever from said pin, a latch to hold said lever in abnormal position and a finger-piece carried with said latch for co-operation with said pin to disengage said latch from said lever, substantially as described.

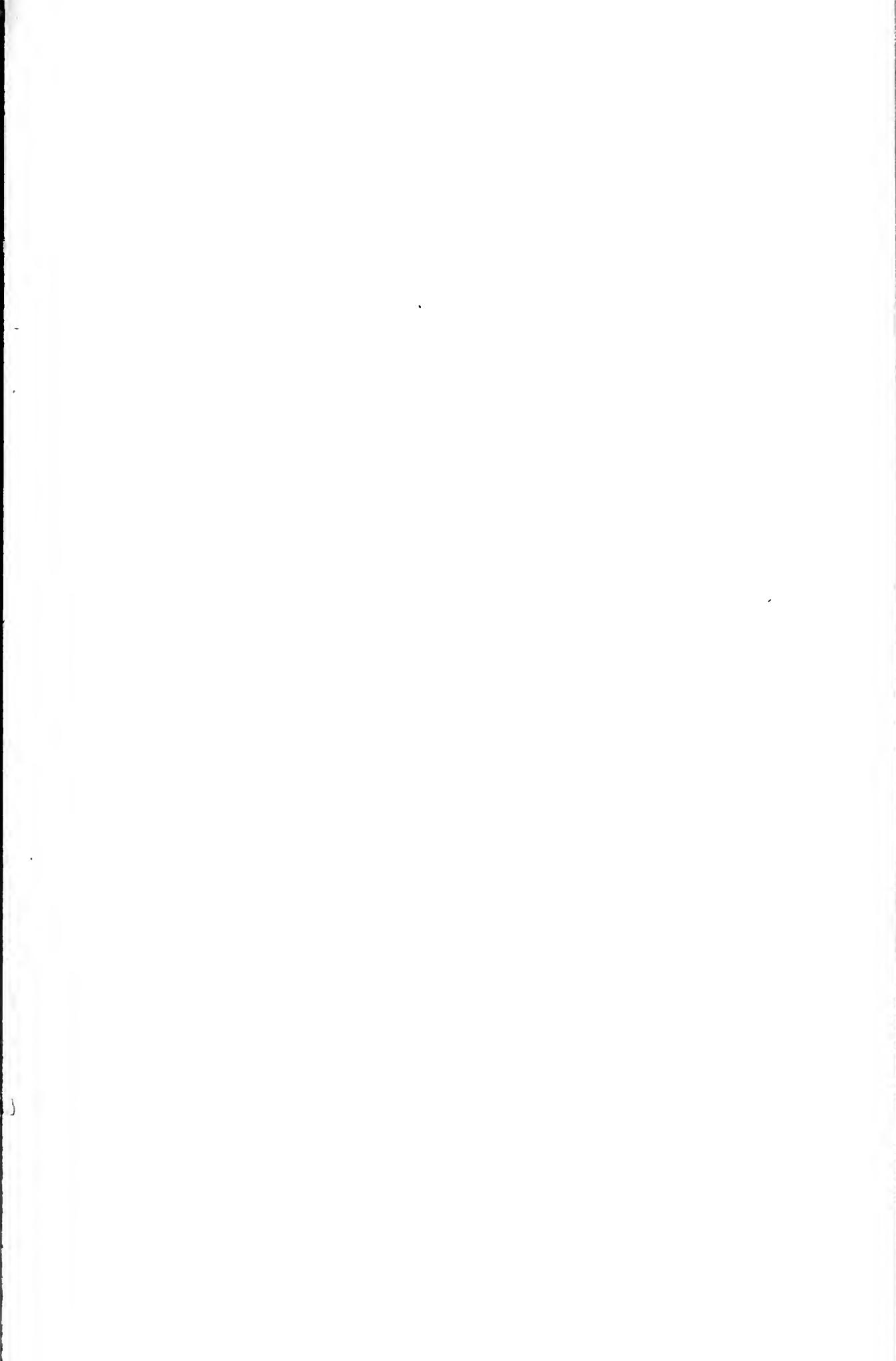
This specification signed and witnessed this 18th day of August, A. D. 1903.

GEORGE ALBERT MOORE.

In presence of—

JOHN M. SCOBLE,
W. B. GREELEY.





No. 764,868.

PATENTED JULY 12, 1904.

G. ROBERTSON.
SOUND BOX.

APPLICATION FILED DEC. 1, 1903.

NO MODEL.

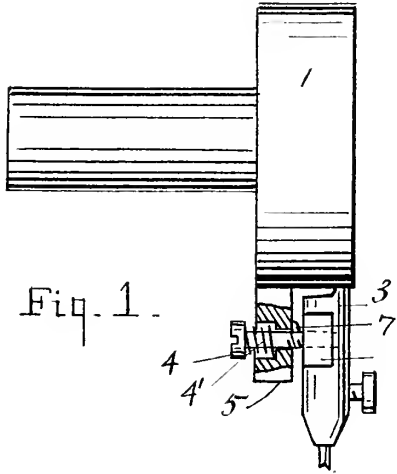


Fig. 1.

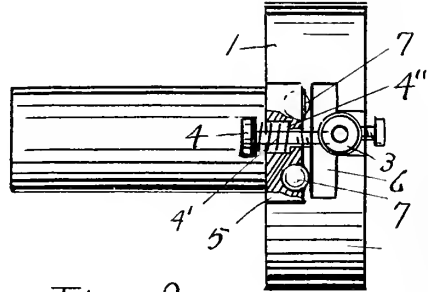


Fig. 2.

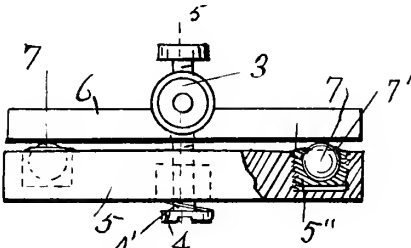


Fig. 3.

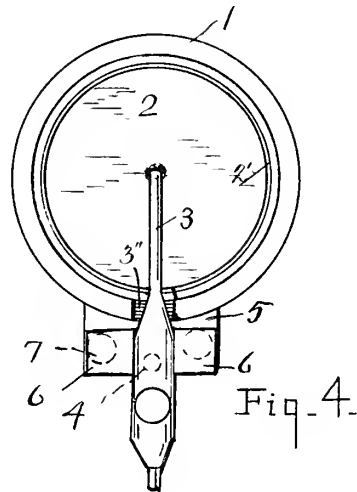


Fig. 4.

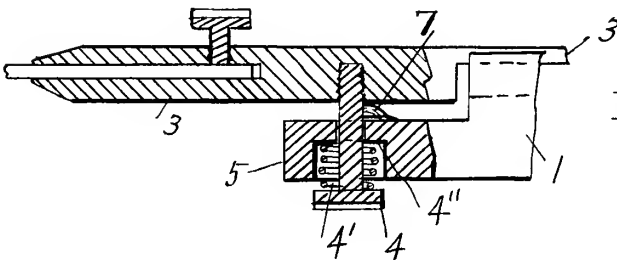


Fig. 5.

Inventor

Witnesses
D. W. Gould,
Benj. R. batlin

George Robertson
By *Charles M. Catlin*

Attorney

UNITED STATES PATENT OFFICE.

GEORGE ROBERTSON, OF TOLEDO, OHIO.

SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 764,868, dated July 12, 1904.

Application filed December 1, 1903. Serial No. 183,337. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ROBERTSON, a resident of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Sound-Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to sound-boxes for disk talking-machines, and particularly to the supporting means for the needle-arm, the object being to improve and simplify such means.

In the accompanying drawings, Figures 1 and 2 are side views at right angles to each other of a sound-box having the improvements. Fig. 3 is an enlarged side view of a modification of the bearing for the needle-arm. Fig. 4 is a front view of the sound-box, and Fig. 5 is a partial sectional view on line 5-5 of Fig. 3 on an enlarged scale.

Numeral 1 denotes the sound-box body, 2 the diaphragm, and 3 the needle-arm. This arm is connected to the center of the diaphragm and extends radially beyond the periphery of the box, where it is supported by a tension-spring 4' and screw or pin 4, which screw or pin is held loosely in a hole in the projection 5 of box 1, and the projection is either integral or non-integral with the box, preferably the former, as it is safer. In said hole is the spiral tension-spring which presses against the head of the screw and against a ledge 4" in the hole. Thus the screw (and hence the needle-arm) is supported by the tension of said spring.

Just outside of the box needle-arm 3 is provided with side wings or bearing parts 6 6, the smooth flat inner side of which rests on the hard smooth rounded parts, preferably polished steel balls 7, which are in depressions in the extension or which are in sockets 5", screwed into holes in part 5. The balls are held securely in place by overlying material extending outward beyond the centers of the balls, so as to hold the balls from falling out when they are not under wings 6. The balls may thus be held stationary or they may be sufficiently loose in their sockets to allow them to turn.

The screw or pin 4 draws the wings 6 of the needle-bar against balls 7. When arm 3 is vibrated by a record, wings 6 move slightly on the round parts 7 where said parts touch. Evidently the balls may be fixed to wings 6 instead of to part 5. The balls can bear directly against the flat inner side of wings 6 without the formation of special bearing places. The balls wear the opposing surface so little as to be negligible. The reproducer is therefore not interfered with.

It will be seen that there is but one tension-screw used and that but one is necessary, owing partly to the coöperating action of the wings and balls.

I have shown, Fig. 4, the screw 4 located below the centers of balls 7; but this is not essential. The action is, however, better when said screw is at one side or the other of a line through the center of the balls.

In order to lower the arm 3 to a plane quite near to the plane of the diaphragm, a notch 3" for said arm is formed in the outer edge of the sound-box. In this way arm 3 is brought down nearly to the wire ring 2', which holds the diaphragm.

What I claim is—

1. A talking-machine sound-box having a suitable case, diaphragm, and a needle-arm operatively connected at one end to the diaphragm, a single screw adjustably supported in the needle-arm and extending loosely through an extension from the box, a spring between the extension and the head of the screw, the rounded bearing against which the arm presses normally, said screw engaging the arm at a point at one side of a plane transverse to the arm and passing through the center of the rounded bearing, whereby adjustment of said screw changes the tension of the arm on the diaphragm.

2. A talking-machine sound-box having a suitable case, diaphragm, and needle-arm, means for securing said arm outside of the case consisting of a projecting part 5, and a single screw extending therethrough into said arm, and balls on opposite sides of the axis of said needle-arm against which the arm bears and on which it can move.

3. A talking-machine sound-box having a suitable case, diaphragm, needle-arm with op-

posite side wings, a single screw for securing said arm, and balls on opposite sides of the axis of the needle-arm against which said wings bear and on which they can move.

5 4. A talking-machine sound-box having a case, diaphragm, and needle-arm, a single screw for securing said arm, and balls on opposite sides of the axis of said needle-arm against which the arm bears on opposite sides
10 of said axis of the needle-arm and also at one side of a plane transverse to the needle-arm and passing through the axis of the screw.

15 5. A talking-machine sound-box having a suitable case, diaphragm, and needle-arm, a notch in the case for the arm, a part 5 projecting from the case at the rear of said notch, and means in part 5 supporting the arm.

6. A sound-box case having a projecting

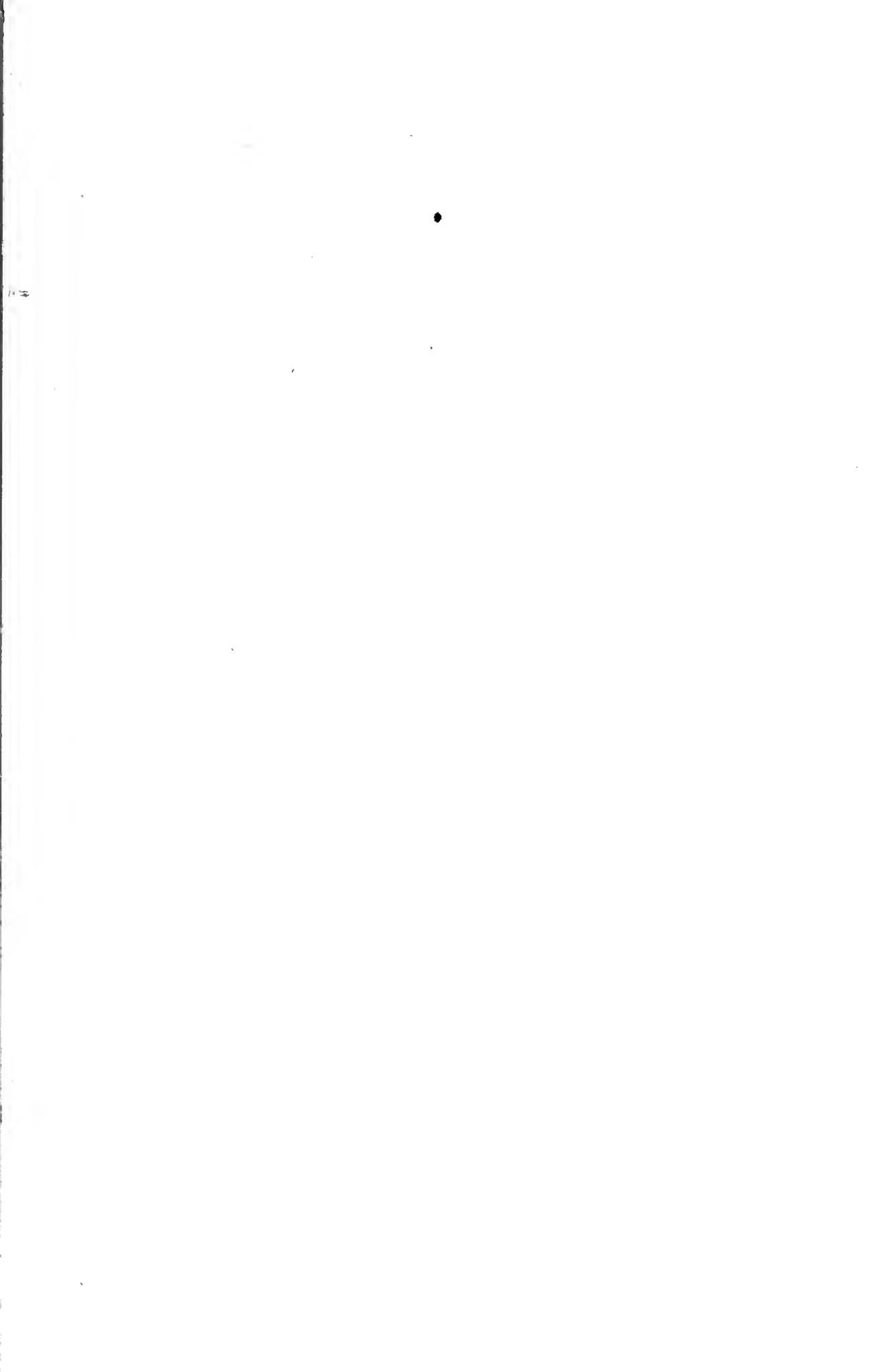
part, a diaphragm and a needle-arm in said box-case, the arm connecting with the dia- 20 phragm and extending over the projecting part, and means consisting of a single screw extending through the projecting part into the needle-arm, and a spiral tension-spring between the screw and the projecting part for 25 adjustably securing the needle-arm thereon, and balls forming a bearing for the needle-arm.

In testimony whereof I have signed this specification in the presence of two subscrib- 30 ing witnesses.

GEORGE ROBERTSON.

Witnesses:

CLEM V. WAGNER,
L. M. WILLIAMSON.



No. 765,462.

PATENTED JULY 19, 1904.

W. N. DENNISON.
TURN TABLE FOR TALKING MACHINES.

APPLICATION FILED AUG. 21, 1903.

NO MODEL.

Fig 1.

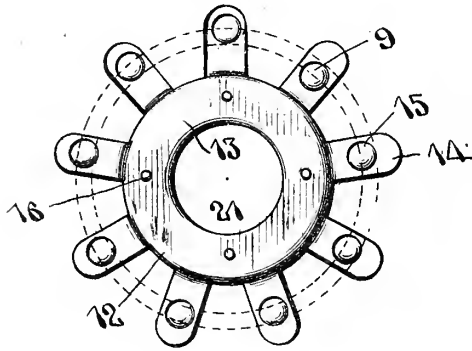


Fig 2.

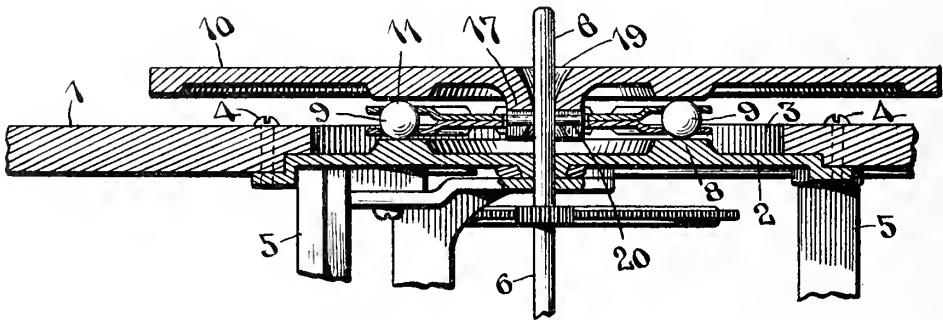
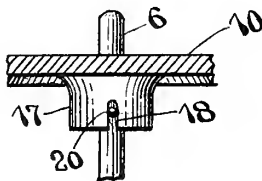


Fig 3.



WITNESSES:

F. J. Hartman.

Edw. W. Vaill Jr.

INVENTOR

Wilburn N. Dennison

BY

I. J. MacBeth

ATTORNEY.

UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TURN-TABLE FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 765,462, dated July 19, 1904.

Application filed August 21, 1903. Serial No. 170,232. (No model.)

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of Camden, State of New Jersey, have invented certain new and useful Improvements in Turn-Tables for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide a connection between the turn-table used in the disk type of talking-machines and the driving-spindle therefor such that said spindle or shaft will not be bent or thrown out of alignment when the turn-table is subject to undue pressure or strains upon any portion thereof by reason of heavy articles being placed thereon or by reason of being pressed upon heavily by a person's hand while winding the motor. To attain this object, I employ a turn-table that tilts freely and independently of the bearing upon which it rotates, so that when it is pressed upon it will yield, but will upon the removal of the pressure resume its normal position. This construction is made desirable because of the fact that many persons in winding a talking-machine motor, especially in the smaller sizes of machine, carelessly place one hand upon the turn-table with considerable pressure in order to hold the casing in position while the motor is being wound by the other hand. Said construction is also desirable because of the fact that often in shipping machines from one place to another the turn-table spindle is liable to become bent by careless or rough handling.

For a full, clear, and exact description of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 represents a plan view of the ball-carrier for the balls of the yieldable connection; Fig. 2, a transverse central sectional view of a turn-table and the upper part of the motor-casing, showing the parts in position; and Fig. 3, an elevation, partly in section, showing the hub portion of the turn-table and its driving connection with the motor-spindle of shaft.

Referring to Fig. 2 of the drawings, the

numeral 1 indicates the top or cover of the box or casing containing the motor. 2 is a flanged plate which is slightly countersunk into the inner surface of the casing 1, so as to cover the circular opening 3 therein, and is attached to said casing in any suitable manner, such as by the screws 4. To the under side of the plate 2 is attached the support 5 for the parts of the motor, the driving-spindle 6 of which projects through a central opening 7 in said plate. The upper side of said plate 2 is provided with a ring or flange 8, upon which the balls 9 are adapted to revolve around the central spindle. The turn-table 10 is also provided with a corresponding ring 11, which rests upon the top of said balls 9, and thereby supports the turn-table 10. The ball-carrier 12 comprises a ring 13, having a series of radial arms 14, which project therefrom in pairs, and having openings 15 registering with each other in the respective arms, so as to form sockets for the balls 9, which project at opposite sides beyond the outer surface of said arms. The openings 15 in said arms are not all the same distances from the center of the ring 13 or its axis of rotation; but each is placed farther out on the arms, beginning with the innermost one, a slight distance in order that none of said balls will follow in the same track upon the rings 8 and 11. In Fig. 1 the dotted lines represent the tracks of the innermost and outermost of the balls 9 and also the relation of the centers of said balls as they revolve about the axis of the spindle 6. The difference between the distances of any two consecutive balls between their centers and the axis of rotation of the spindle is about fifteen one-thousandths of an inch, which makes the bearing-space for the nine balls shown slightly over one-eighth of an inch. The ball-carrier is preferably formed of two similar plates of metal stamped out in the usual manner and fastened together by the rivets 16; but I do not wish to be limited to this method of forming the ball-carrier.

The lower side of the turn-table 10 is provided with a boss or hub 17, which projects slightly below the plane of the centers of the balls 9 and is provided with the vertical slots or re-

cesses 18. The opening 19 through this hub and the turn-table 10 is made tapering in two directions, as indicated in Fig. 2, and when said turn-table is in position fits loosely about the motor-spindle 6. Said spindle 6 is provided with a pin 20, which engages the slots 18 and provides means for giving the table a rotary motion as said spindle is rotated by the motor. The central opening 21 of the ball-carrier 12 fits loosely about the hub 17 and retains said ball-carrier in actual position, so that the balls will follow the requisite paths on the rings 8 and 11. It will now be seen that when one side of the turn-table 10 is forced downward the balls 9 adjacent thereto will form a fulcrum for said turn-table, whereby the opposite side thereof will be raised and the hub 17 will be moved longitudinally a slight distance on the spindle 6, thus preventing any undue strains coming upon said spindle. When said pressure is removed, the parts will immediately assume their normal positions, and the pins 20 will reënter the slots 18 if they have been removed therefrom by the tilting movement of the turn-table.

I do not wish to be limited to the exact form and proportion of parts shown in the drawings, for the same may be varied to accord with different choice of designs without departing from the spirit of my invention. In Fig. 2 for convenience I have shown the diameters of the flanges 8 and 11 somewhat larger in proportion to the diameter of the turn-table than is adopted in practical use, the present portions being shown merely for clearness of description.

Having thus described my invention, what I claim, and desire to protect by Letters Patent of the United States, is—

1. In a sound recording or reproducing machine, a record-support, means for rotating the same, and a bearing independent of said means, said record-support being rotatably mounted upon, and tiltable away from and toward said bearing, and independently thereof.

2. In a sound recording or reproducing machine, a record-support, a driving-spindle therefor, and a bearing independent of said spindle, said record-support being rotatably mounted upon, and tiltable away from and toward said bearing, and independently thereof.

3. In a sound recording or reproducing machine, a part thereof forming a support for antifriction devices, antifriction devices mounted upon said support, and a record-support mounted upon said antifriction devices, said record-support being tiltable away from and toward said support, and independently thereof.

4. In a sound recording or reproducing machine, antifriction devices, and a record-support mounted thereon, said record-support being tiltable away from and toward said antifriction devices, and independently thereof.

5. In a sound recording or reproducing machine, antifriction devices, and a record-support rotatable thereon, said record-support being freely movable away from and toward said antifriction devices, and independently thereof.

6. In a sound recording or reproducing machine, antifriction devices, and a record-support rotatably mounted thereon, said record-support being tiltable away from and toward said antifriction devices, and independently thereof.

7. In a sound recording or reproducing machine, antifriction devices, the members of which are secured in fixed relation, and a record-support rotatably mounted thereon, said record-support being tiltable away from and toward said antifriction devices, and independently thereof.

8. In a sound recording or reproducing machine, antifriction devices, a support therefor, and a tiltable record-support mounted upon said antifriction devices, and means independent of said support and record-support for holding the members of said antifriction devices in position and relatively fixed.

9. In a sound recording or reproducing machine, a driving-spindle, a record-support loosely connected therewith, and antifriction devices upon which said record-support is rotatably mounted, said record-support being tiltable away from and toward said antifriction devices, and independently thereof.

10. In a sound recording or reproducing machine, antifriction devices, a carrier therefor, and a tiltable record-support mounted upon said antifriction devices, and engaging said carrier, and serving as the sole means for restraining lateral movement thereof.

11. In a sound recording or reproducing machine, antifriction devices, a carrier therefor, a tiltable record-support mounted upon said antifriction devices, and a projection upon said record-support engaging said carrier, and serving as the sole means for restraining lateral movement thereof.

12. In a sound recording or reproducing machine, antifriction devices, a carrier therefor, a tiltable record-support mounted upon said antifriction devices, and a downwardly-extending central projection upon said record-support, engaging said carrier, and serving as the sole means for restraining lateral movement thereof.

13. In a sound recording or reproducing machine, antifriction devices, a carrier therefor having a central opening, a tiltable record-support mounted upon said antifriction devices, and a central downwardly-projecting boss upon said record-support situated within said opening in the carrier, and serving as the sole means for restraining lateral movement thereof.

14. In a sound recording or reproducing machine, antifriction devices, a record-support

tiltably mounted thereon, and means independent of said record-support for holding the said devices, said means being engaged and held laterally by said support.

5 15. In a sound recording or reproducing machine, a driving-spindle, a record-support loosely connected therewith and having an opening to receive said spindle, said spindle fitting loosely within said opening to permit
10 said support to tilt, and a bearing, said record-support being rotatably mounted upon said bearing and tiltable relative thereto.

16. In a sound recording or reproducing machine, a driving-spindle, a record-support
15 loosely connected therewith, and having a downwardly-extending central projection, said spindle passing loosely through an opening in said support and projection to permit the support to tilt, a carrier having an opening receiving said projection, and antifriction devices carried by said carrier, and upon which
20 said support is relatively tiltable.

17. In a sound recording or reproducing machine, a casing having a circular track, a carrier having antifriction devices resting upon
25 said track, and a record-support having a circular track engaging said antifriction devices, said record-support being tiltable upon and relative to said antifriction devices.

18. In a sound recording or reproducing machine, a casing having a circular track, a carrier having arms carrying antifriction devices resting upon said track, said antifriction
30 devices projecting above and below said arms, and a record-support resting upon said antifriction devices and tiltable relative thereto.

19. In a sound recording and reproducing machine, a record-support, means for rotating the same, and a bearing independent of said
40 means and forming the sole support for said record-support, and said record-support being tiltable away from and toward said bearing, and independently thereof.

20. In a sound recording and reproducing machine, a part thereof forming the sole means for supporting a record-support, the record-support rotatably mounted thereon, and a driving-spindle independent of said means and loosely engaging said record-support.

21. In a sound recording or reproducing machine, a casing having a circular track, antifriction devices resting upon said track, a record-support rotatably mounted and relatively
50 tiltable upon said antifriction devices, and means for holding said antifriction devices at different radii from the axis of rotation of said record-support.

22. In a sound recording or reproducing machine, a driving-spindle, a turn-table loosely
60 mounted thereon so as to revolve therewith, a motor-casing, a part carried by said casing and having a circular track thereon, a corresponding circular track formed on said turn-table and antifriction devices located between said
65 tracks, said turn-table being tiltable inde-

pendently of said part having the circular track supporting the antifriction devices.

23. In a sound recording or reproducing machine, a driving-spindle, a turn-table loosely
70 mounted thereon so as to revolve therewith, a motor-casing, a part carried by said casing having a circular ball-track thereon, a corresponding circular ball-track formed on said turn-table and antifriction-balls located between
75 said tracks, said turn-table being tiltable independently of said part having the circular ball-track supporting said balls.

24. In a sound recording or reproducing machine, a turn-table, a spindle on which said
80 turn-table is mounted so as to revolve therewith, a motor-casing, a part carried by said casing forming a flat circular ball-track, a corresponding flat circular ball-track formed on said turn-table, antifriction-balls between said
85 tracks and means independent of said turn-table for holding said balls in position between said tracks.

25. In a sound recording or reproducing machine, a driving-spindle, a turn-table or record-support loosely mounted thereon so as to
90 revolve therewith and having a flat circular ball-track on its under side, a motor-casing, a part carried by said casing forming a flat circular ball-track, antifriction-balls located between said tracks and means for holding said
95 balls between said tracks at different radii from the axis of rotation of the spindle.

26. In a sound recording or reproducing machine, a driving-spindle, a turn-table loosely
100 mounted thereon so as to revolve therewith and having a flat circular ball-track on its under side, a motor-casing, a part carried by said casing forming a similar flat circular ball-track, antifriction-balls located between said
105 tracks and a ball-carrier held loosely in position by said turn-table and having sockets for holding said balls between said tracks at different radii from the axis of rotation of the spindle.

27. In a sound recording or reproducing machine, a driving-spindle, a turn-table loosely
110 mounted thereon so as to revolve therewith and having a flat circular ball-track on its under side and also provided with a central hub or boss, a motor-casing, a part carried by said
115 casing having a second flat circular ball-track, antifriction-balls located between said tracks and a ball-carrier held loosely in position by said hub or boss.

28. In a sound recording or reproducing machine, a driving-spindle, a turn-table loosely
120 mounted thereon so as to revolve therewith and having a flat circular ball-track on its under side and also provided with a central hub or boss, a motor-casing, a part carried by said
125 casing having a second flat circular ball-track, antifriction-balls located between said tracks, and a ball-carrier having ball-sockets at different radii from the axis of rotation and held loosely in position by said hub or boss.
130

29. In a sound recording or reproducing machine, a driving-spindle, a turn-table loosely mounted thereon so as to revolve therewith having a flat circular ball-track on its under side and also provided with a central hub or boss, a motor-casing, a part carried by said casing having a second flat circular ball-track, antifriction-balls located between said tracks, annular ball-carrier held loosely in position by said hub or boss and having arms provided with ball-sockets of different radii from the axis of rotation.

30. In a sound recording or reproducing machine, a turn-table having a ball-track on its under side and also provided with a central hub or boss, a double inwardly-tapering opening being provided in said turn-table and boss, said boss having slots in its lower end, a driving-spindle having transverse projections adapted to engage said slots, a motor-casing, a part carried by said casing having a second ball-track, antifriction-balls located between said

tracks and means for holding said balls in position.

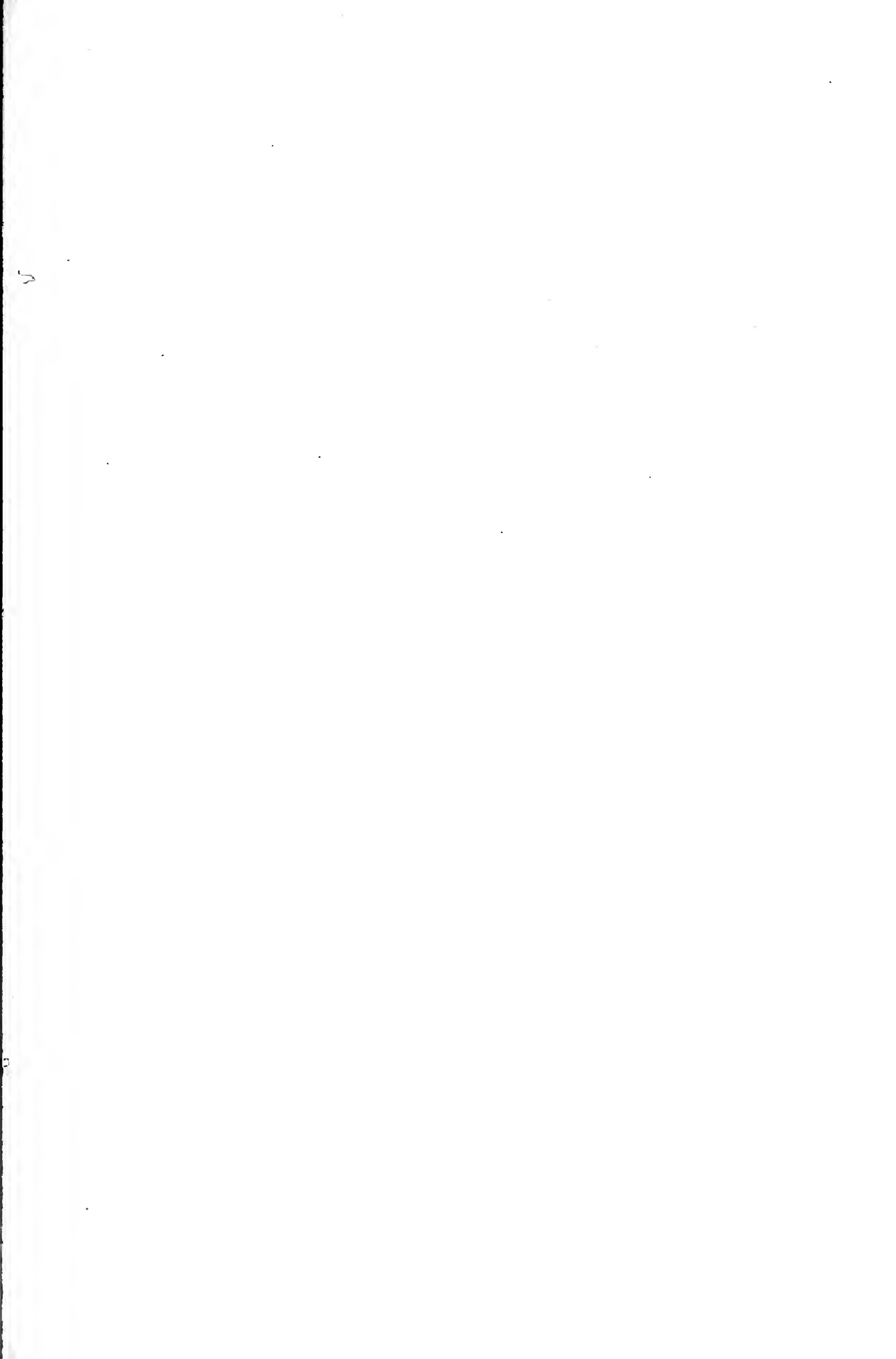
31. In a sound recording or reproducing machine, a driving-spindle having transverse projections thereon, a turn-table having a flat circular ball-track on its under side and also provided with a central hub or boss having an opening therethrough through which said driving-spindle is adapted to pass loosely and also having slots in its lower end adapted to engage said transverse projections, a part carried by said casing having a second flat circular ball-track, antifriction-balls located between said tracks, and a ball-carrier surrounding said hub or boss and held loosely in position thereby.

In witness whereof I have hereunto set my hand this 20th day of August, A. D. 1903.

WILBURN N. DENNISON.

Witnesses:

JOHN B. RUTHERFORD,
EDW. W. VAILL, Jr.



No. 765,522.

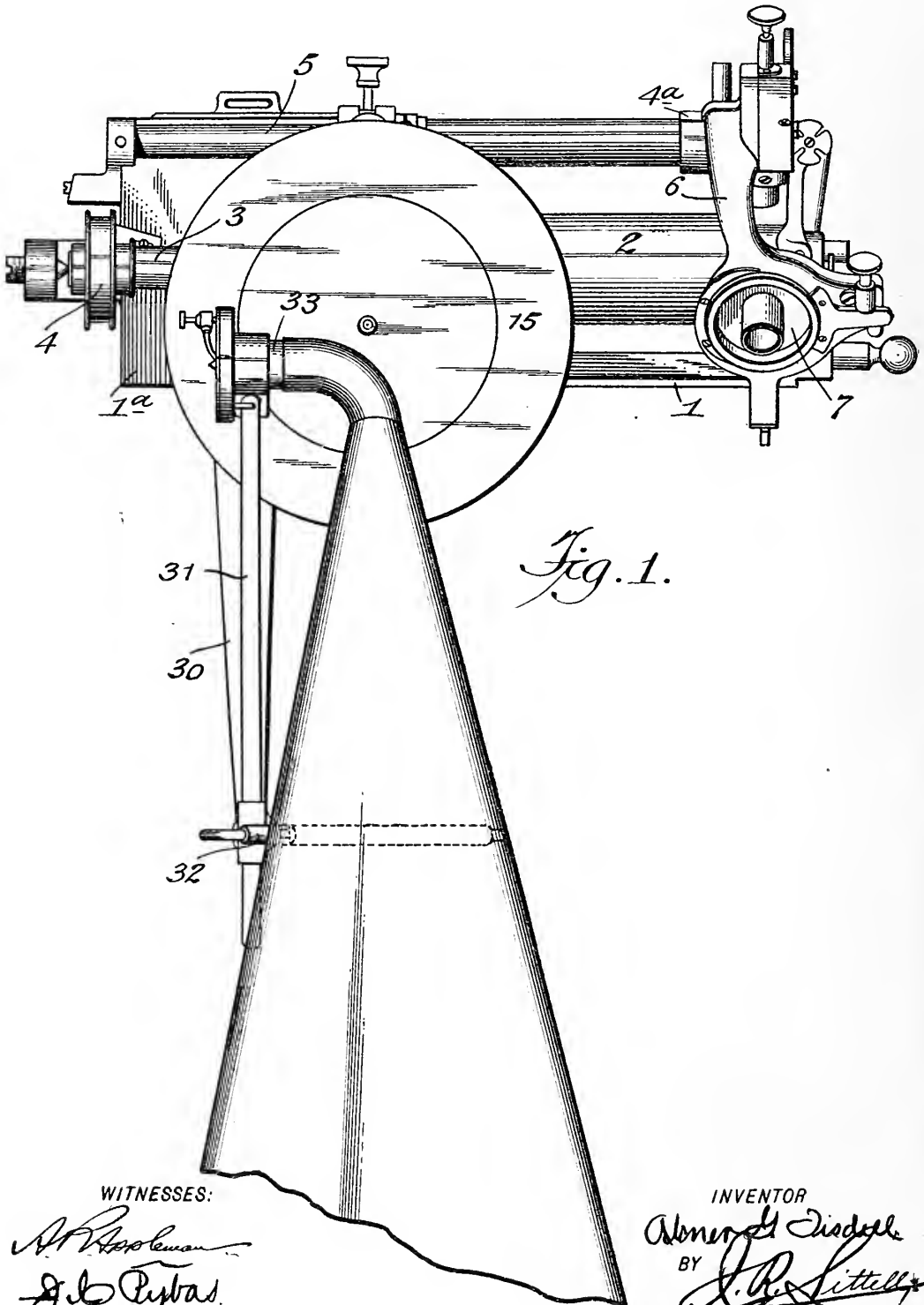
PATENTED JULY 19, 1904.

A. G. TISDELL.
MACHINE FOR REPRODUCING SOUND.

APPLICATION FILED OCT. 20 1903.

NO MODEL.

2 SHEETS—SHEET 1.

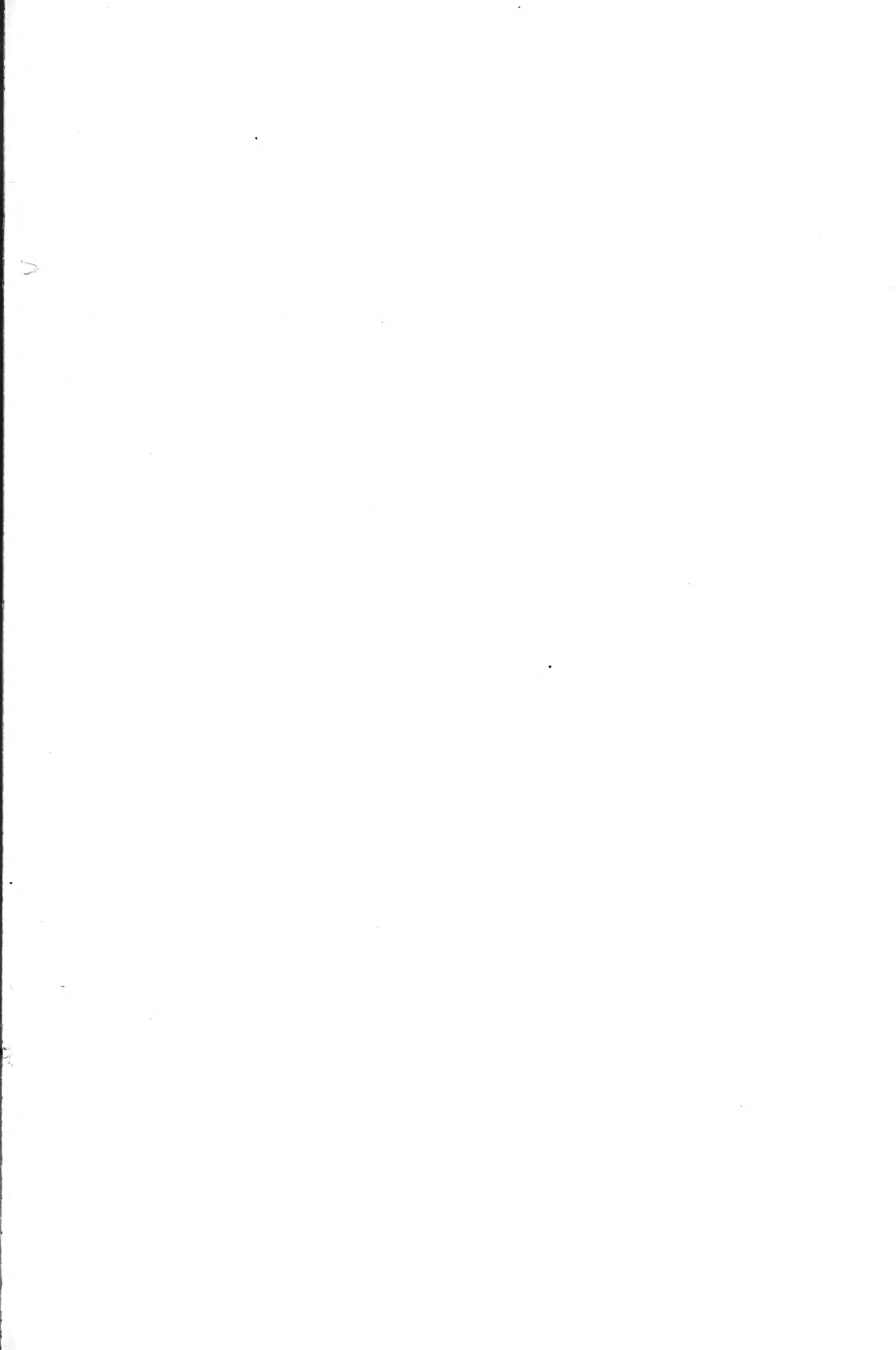


WITNESSES:

A. P. ...
J. B. ...

INVENTOR

Almon G. Tisdell
BY *J. R. Sittell*
ATTORNEY.



A. G. TISDELL.
MACHINE FOR REPRODUCING SOUND.

APPLICATION FILED OCT. 20, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

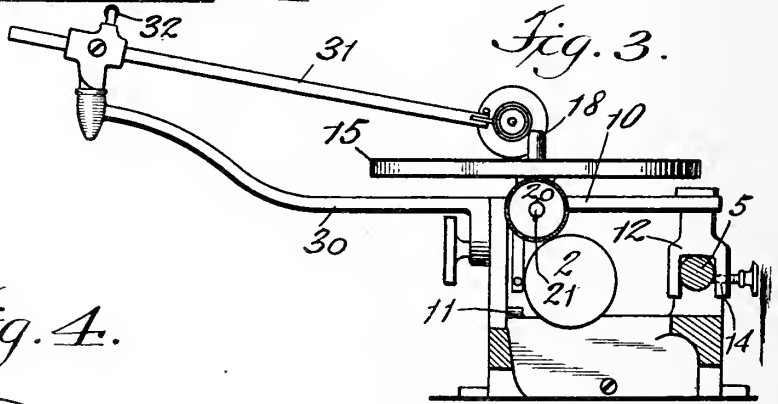
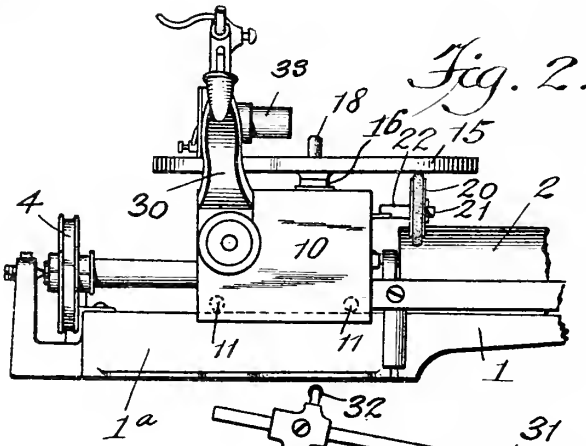
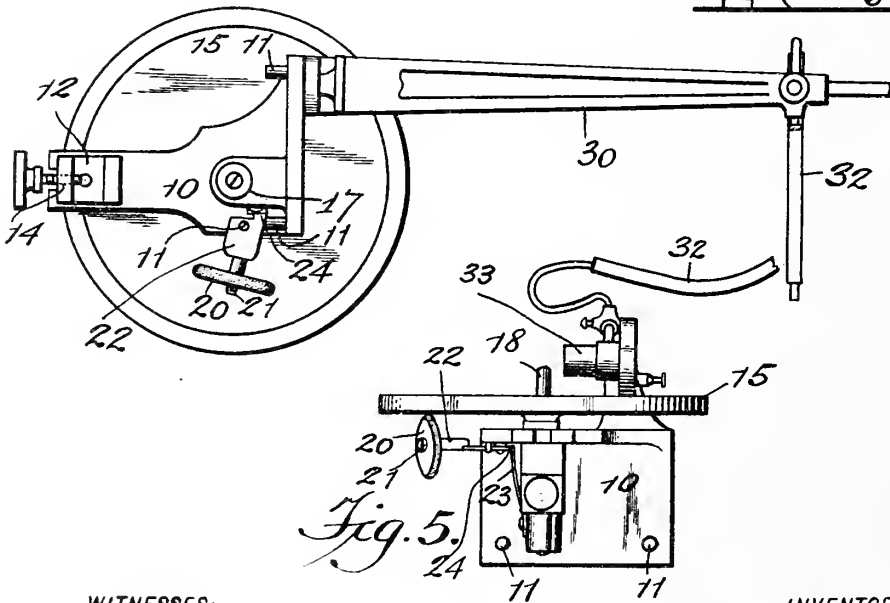


Fig. 4.



WITNESSES:

H. P. ...
J. B. ...

INVENTOR

Alfred G. Tisdell,
 BY *J. P. Littell,*
 ATTORNEY

UNITED STATES PATENT OFFICE.

ABNER G. TISDELL, OF BROOKLYN, NEW YORK.

MACHINE FOR REPRODUCING SOUND.

SPECIFICATION forming part of Letters Patent No. 765,522, dated July 19, 1904.

Application filed October 20, 1903. Serial No. 177,772. (No model.)

To all whom it may concern:

Be it known that I, ABNER G. TISDELL, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Machines for Reproducing Sound, of which the following is a specification.

My invention relates to machines for reproducing sound.

It has for its object to provide an attachment for sound-reproducing machines—such, for instance, as the Edison phonograph or similar machines—to adapt them to play disk records as well as the usual cylindrical record.

It has for a further object to provide a device of the character described possessing advantages in point of simplicity, cheapness, perfect operation, and general utility.

In the drawings, Figure 1 is a plan view of an Edison phonograph having my device attached. Fig. 2 is a front view, one end being broken away. Fig. 3 is an end view, one end being broken away. Fig. 4 is a bottom plan view of my attachment, and Fig. 5 is a rear view.

In referring to the drawings, as I have shown my device attached to an Edison phonograph, the construction and operation of which is well known, it will only be necessary to mention certain parts and in a general way.

1 and 1^a designate the base of the phonograph; 2, the mandrel mounted on an operating-shaft 3, having a pulley 4 for the transmission of power thereto; 4^a, the reciprocal carriage mounted on the guide 5, and 6 the arm thereon carrying the diaphragm 7.

Referring now particularly to my attachment, 10 designates a bracket secured on the base of the phonograph by lugs 11, which rest on the part 1^a of the base, and a forked arm 12, which straddles the guide 5 and is provided with a clamping-screw projecting through a screw-threaded hole 14 in one arm thereof in engaging with said guide. A circular plate 15 for supporting the disk records is rotatably mounted on said bracket 10 by means of a spindle 16, projecting from the under side thereof and journaled in a bearing 17 thereon, and said plate is also provided with

a spindle 18, projecting from the upper side thereof, arranged to engage a hole in the disk records to hold them on the plate 15.

For the purpose of rotating the plate 15 from the mandrel 2 a friction-wheel 20 is journaled on a spindle 21 on the outer end of an arm 22, pivoted on the bracket 10 at 11 in engagement with the under side of the plate 15 and held in engagement with the surface of one end of the mandrel 2 by a leaf-spring 23, engaging a nose 24 on the inner end of the arm 22.

It will be seen from the drawings that the friction-wheel 20 is wedged between the circular plate 15 and spindle 2 by the spring 23 when the spindle is revolved to the right, and thus transmits motion to the plate 15, and that said spring allows the friction-wheel to be forced out of contact with the plate 15 by the spindle 2 when said spindle is revolved in the reverse direction, thus allowing said plate to remain still.

An arm 30 is secured to the front part of the bracket 10 and receives the outer end of the arm 31, on the inner end of which the diaphragm is mounted, and also receives one end of a support 32 for the outer end of the horn, the inner end of the horn slipping over the sleeve 33 on the diaphragm.

The operation is as follows: When the mandrel 2 is revolved to the right, the friction-wheel 20 is drawn thereby between it and the plate 15, transmitting rotary movement to said plate, and consequently to the disk-record plate; but when the mandrel is revolved in the reverse direction it forces the friction-wheel away from the circular plate 15, allowing it to remain at rest and consequently the disk-record plate remains at rest. As the attachment is removable, if it be desired to play the cylindrical record instead of the disk record the screw 13 is loosened and the device taken off.

I do not desire to be understood as limiting myself to the details of construction and arrangement as herein described and illustrated, as it is manifest that variations and modifications may be made in the features of that construction and arrangement without departing from the spirit and scope of my invention

and improvements. I therefore reserve the right to all such variations and modifications as properly fall within the scope of my invention and the terms of the following claims.

5 Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A machine for reproducing sound having a rotary disk-record-supporting plate, a rotary cylinder, and means supported inde-
10 pendently of said rotary cylinder and in contact therewith and with the record-supporting plate for rotating said record-supporting plate, substantially as described.

2. A machine for reproducing sound having
15 a rotary disk-record-supporting plate, a rotary cylinder, and a rotary wheel supported independently of the rotary cylinder and in contact therewith and with the record-sup-
20 porting plate for rotating said record-supporting plate, substantially as described.

3. A machine for reproducing sound having a rotary disk-record-supporting plate, a rotary cylinder, and a rotary spring-pressed wheel supported independently of the rotary
25 cylinder and in contact therewith and with the record-supporting plate, for rotating said record-supporting plate, substantially as described.

4. A machine for reproducing sound having
30 a rotary disk-record-supporting plate, a ro-

tary cylinder, and means supported inde-
pendently of said rotary cylinder and in con-
tact therewith and with the record-supporting
plate adapted to rotate said record-supporting
35 plate when the cylinder is turned in one di-
rection and to allow said record-supporting
plate to remain at rest when the cylinder is
turned in the reverse direction, substantially
as described.

5. A machine for reproducing sound having
40 a rotary disk-record-supporting plate, a ro-
tary cylinder, a pivoted reciprocatory arm
and a wheel journaled on said arm and in con-
tact with said cylinder and with the record-
supporting plate for rotating said record-sup-
45 porting plate, substantially as described.

6. A machine for reproducing sound having
a removable bracket a rotary disk-record-sup-
porting plate mounted thereon a rotary cylin-
der, a reciprocatory arm pivoted on said
50 bracket, and a wheel journaled on said arm
and in contact with said cylinder and the rec-
ord-supporting plate, for rotating said record-
supporting plate, substantially as described.

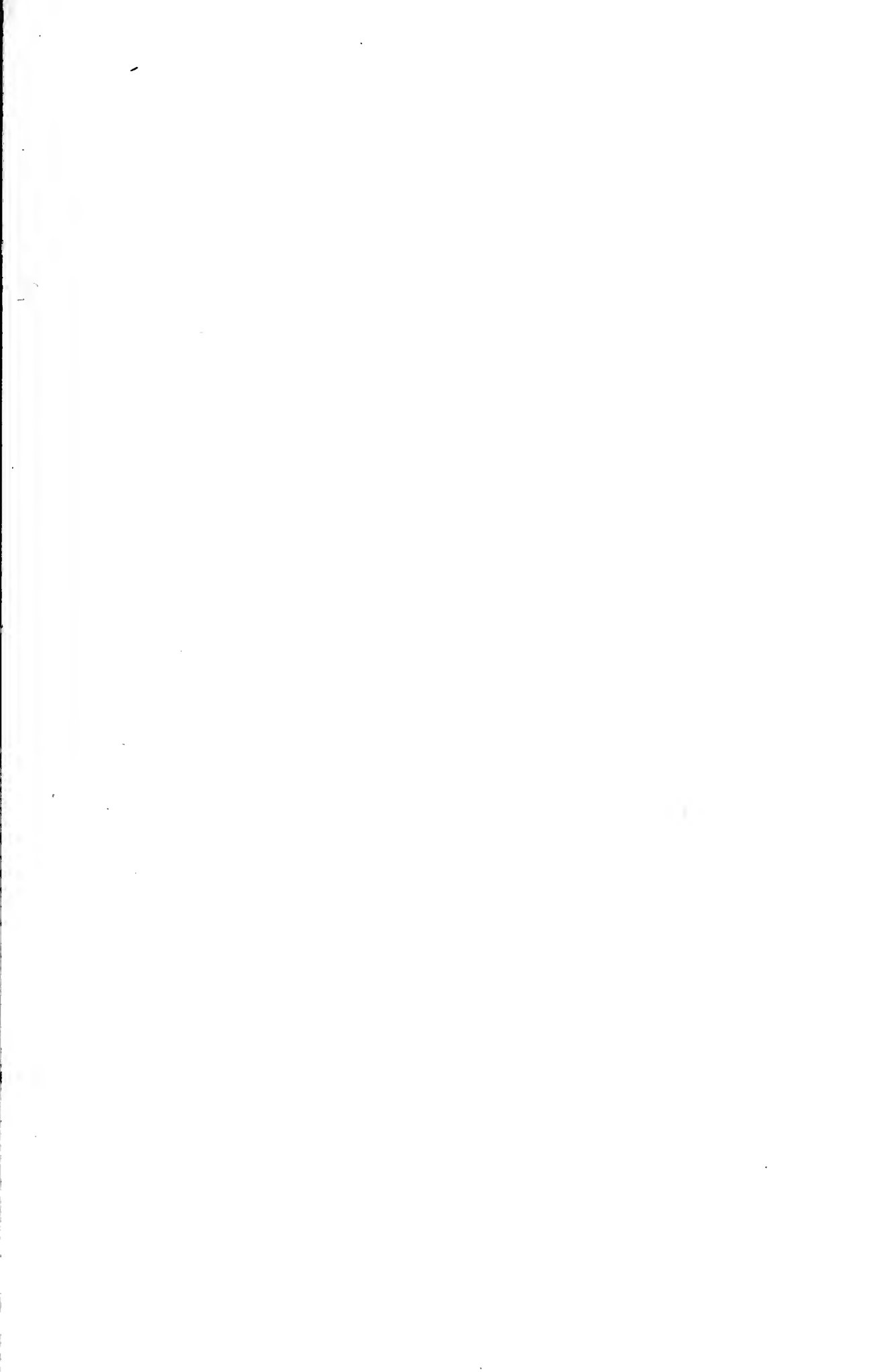
In testimony whereof I have signed my name
55 in the presence of the subscribing witnesses.

ABNER G. TISDELL.

Witnesses:

J. C. PYBAS,

L. E. DUANE.



No. 765,635.

PATENTED JULY 19, 1904.

H. C. ROSE.
TRANSMITTER.

APPLICATION FILED JULY 29, 1903.

NO MODEL.

Fig. 1.

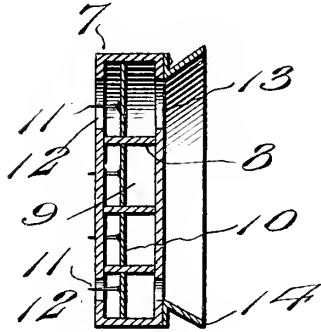
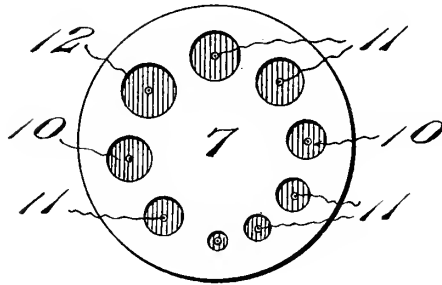


Fig. 2.



Witnesses
Wm. Koertgen
Hubert D. Lawson

Inventor
H. C. ROSE,
By *Victor J. Crane*
Attorney

UNITED STATES PATENT OFFICE.

HARM C. ROSE, OF ROSEMONT, NEBRASKA.

TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 765,635, dated July 19, 1904.

Application filed July 29, 1903. Serial No. 167,410. (No model.)

To all whom it may concern:

Be it known that I, HARM C. ROSE, a citizen of the United States, residing at Rosemont, in the county of Webster and State of Nebraska, have invented new and useful Improvements in Transmitters, of which the following is a specification.

My invention relates to new and useful improvements in transmitters; and its object is to provide a contact adapted to be vibrated by sound-waves whereby a series of sounds of different volume may be accurately indicated to a deaf person, thereby producing sensations which can with practice be used to interpret the sounds producing the vibrations.

With the above and other objects in view the invention consists in providing a drum having diaphragms within it, from which project pins or other suitable contacts adapted to touch the skin of the person using the device, so that when the pins are vibrated corresponding sensations are produced upon the skin.

The invention also consists in the further novel construction and combination of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawings, showing the preferred form of my invention, and in which—

Figure 1 is a section through my improved transmitter, and Fig. 2 is an inner elevation thereof.

Referring to the figures, it will be seen that the device comprises a drum 7, divided, by means of partitions 8, into circular compartments 9. Within each of these compartments is arranged a diaphragm 10, and these diaphragms are of different sizes, and each has a pin 11 extending therefrom through an aperture 12, formed in the rear face of drum 7. Apertures 13 are formed in the front faces of the drum and in alinement with the diaphragms, and these apertures are of different sizes, according to the diaphragms adjacent thereto. The series of apertures 13 are inclosed by a frusto-conical flange 14. By em-

ploying the device herein described the diaphragms will not be vibrated unless the sound produced is sufficiently strong; otherwise only a portion of the diaphragms will be vibrated, and it will thus be seen that the volume of the sound produced will be indicated by the number of diaphragms vibrated.

In using this device the same is strapped or secured in any other suitable manner, preferably to the temple of the person using the same, and when a sound is produced adjacent the transmitter the diaphragms will be vibrated thereby and cause the needles to vibrate upon the skin. It will be obvious that the number and character of the vibrations will change according to the character of the sounds produced, and it will therefore be understood that with practice these differences in the vibrations can be distinguished and the sounds interpreted.

In the foregoing description I have shown the preferred form of my invention; but I do not limit myself thereto, as I am aware that modifications may be made therein without departing from the spirit or sacrificing any of the advantages thereof, and I therefore reserve the right to make such changes as fairly fall within the scope of my invention.

Having thus described the invention, what is claimed as new is—

1. A transmitter of the character described comprising a drum having inlets and outlets in opposite faces thereof, partitions interposed between the said faces and forming independent compartments, each having an inlet and an outlet, a diaphragm within each compartment and interposed between the inlet and outlet thereof, a contact secured in each diaphragm and projecting through the outlet, and a flange inclosing the inlets and projecting from the drum.

2. In a transmitter of the character described, the combination with a drum having compartments therein; of a diaphragm within each compartment, said diaphragms being of

different diameters, and a contact extending from each diaphragm and projecting from the drum.

3. In a transmitter of the character described, the combination with a drum having
5 compartments therein, and each compartment being provided with an inlet and an outlet; of a diaphragm within each compartment, said diaphragms being of different diameters, and

a pin extending from each diaphragm through the outlet adjacent thereto and a flange inclosing the notches. 10

In testimony whereof I affix my signature in presence of two witnesses.

HARM C. ROSE.

Witnesses:

JOHN C. ROSE,

L. B. QUIGGLE.



No. 766,115.

PATENTED JULY 26, 1904.

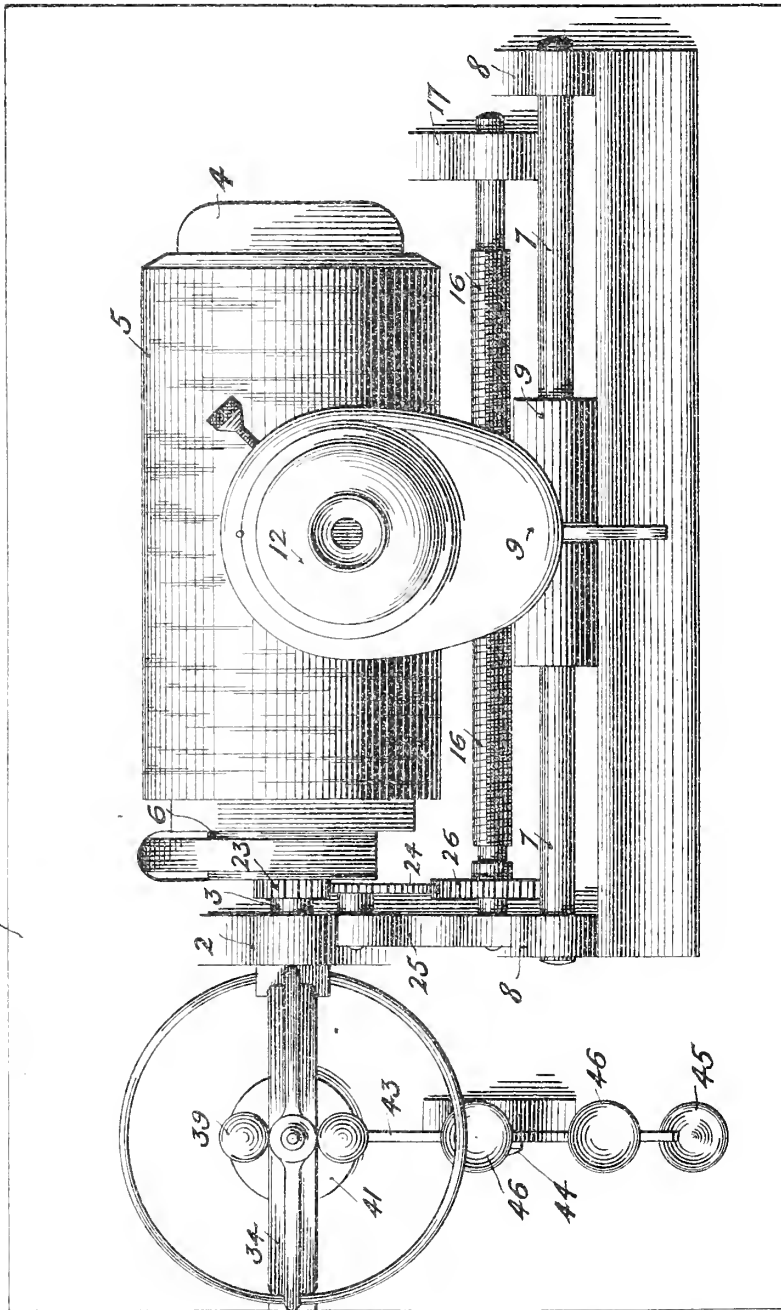
A. N. PETIT.
PHONOGRAPH.

APPLICATION FILED DEC. 19, 1903.

NO MODEL.

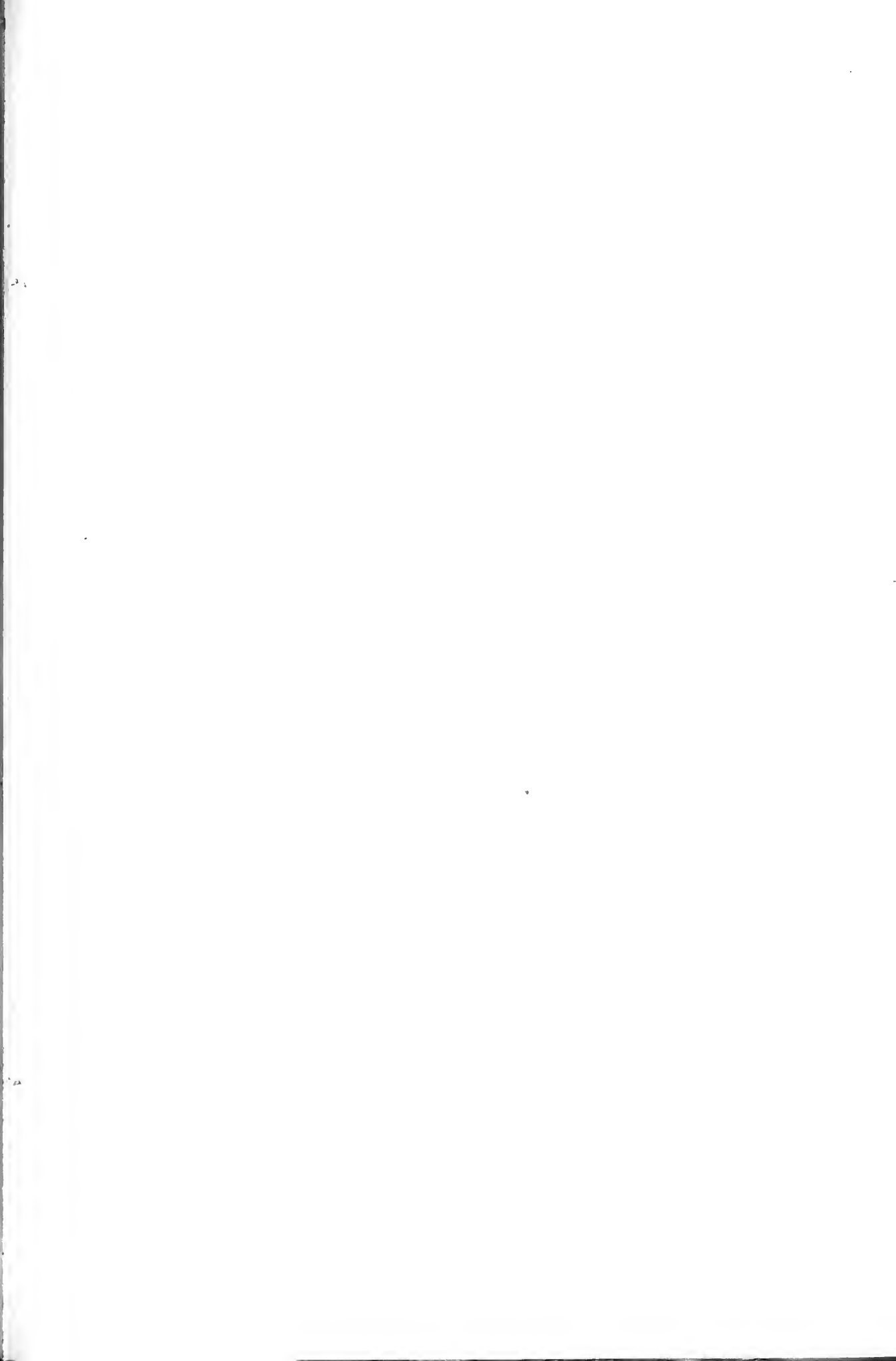
4 SHEETS—SHEET 1.

FIG. 1.



Witnesses
Chas. H. Smith
J. Staib

Inventor
Ademar N. Petit
per Harold Surcell
att'y



A. N. PETIT.
PHONOGRAPH.

APPLICATION FILED DEC. 19, 1903.

NO MODEL.

4 SHEETS—SHEET 2.

FIG: 2.

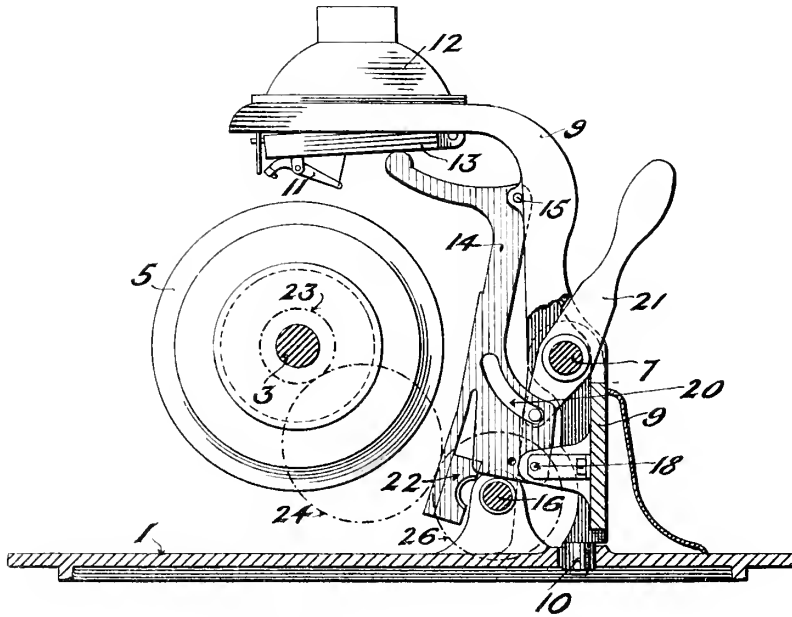


FIG: 3.

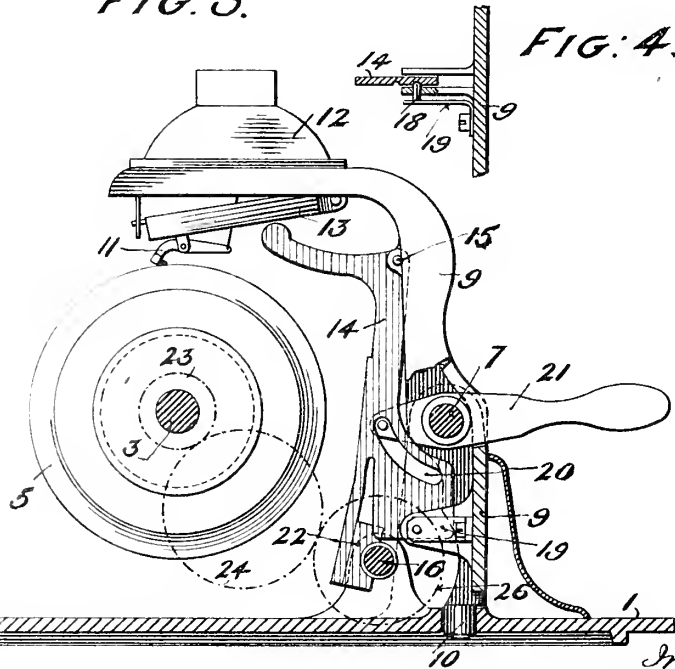
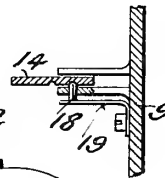


FIG: 4.



Witnesses

Charles Smith
J. Staib

Inventor

Adonir N. Petit
per Harold, Surrell atty



A. N. PETIT.
PHONOGRAPH.

APPLICATION FILED DEC. 19, 1903.

NO MODEL.

4 SHEETS—SHEET 3.

FIG: 5.

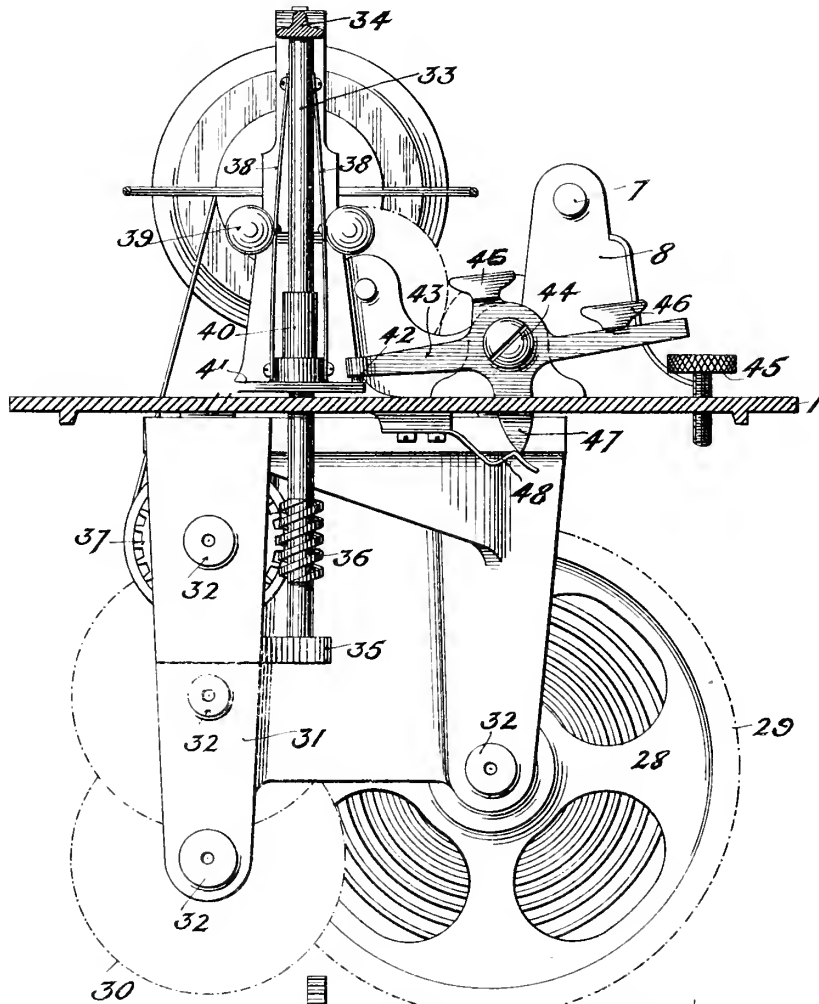


FIG: 7.

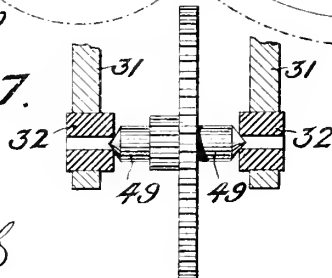
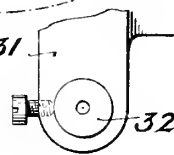


FIG: 8.



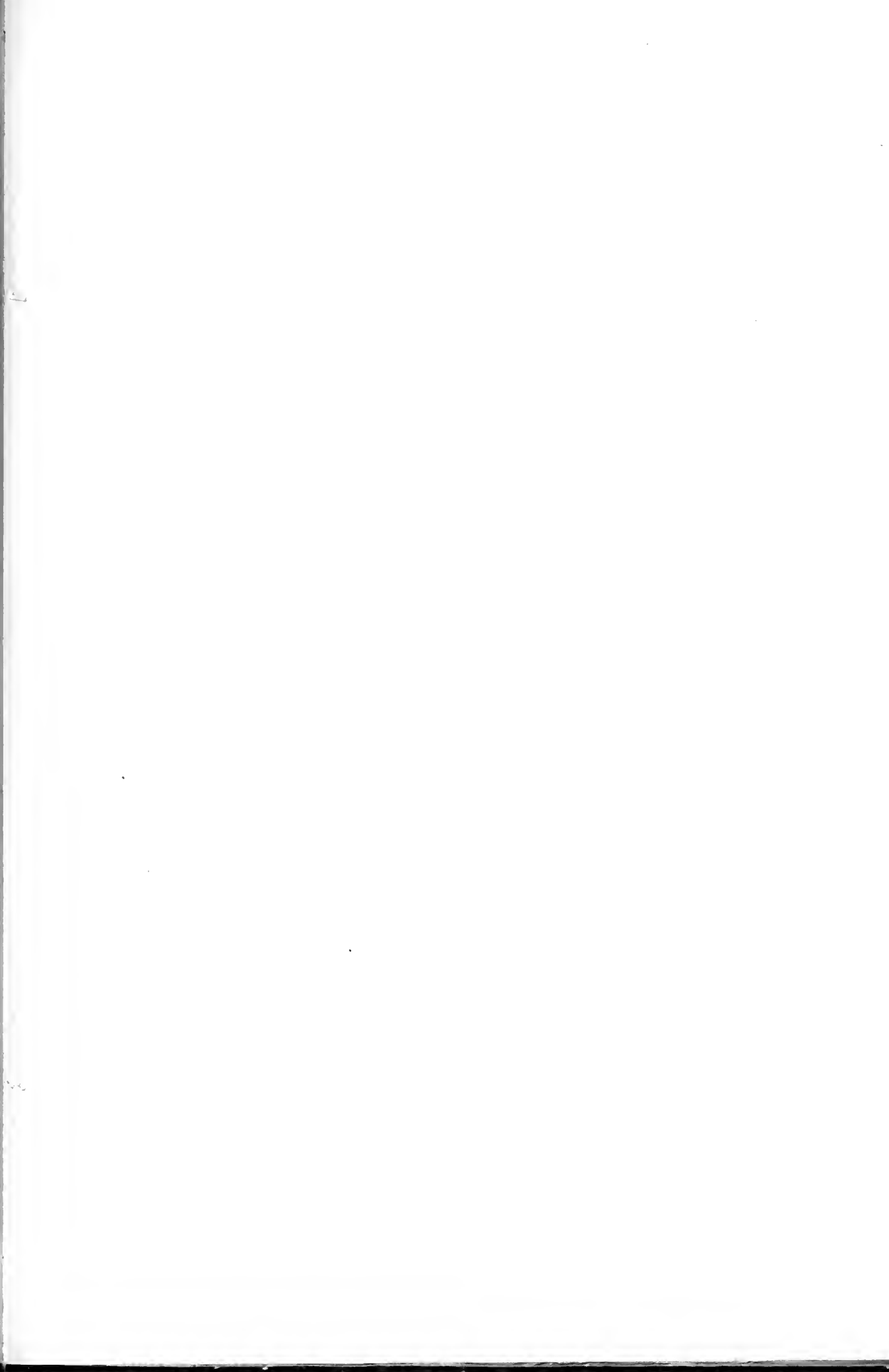
Witnesses

Chas. A. Smith
J. Staib

Inventor

Ademor N. Petit.
per Harold Surmel

Att'y



No. 766,115.

PATENTED JULY 26, 1904.

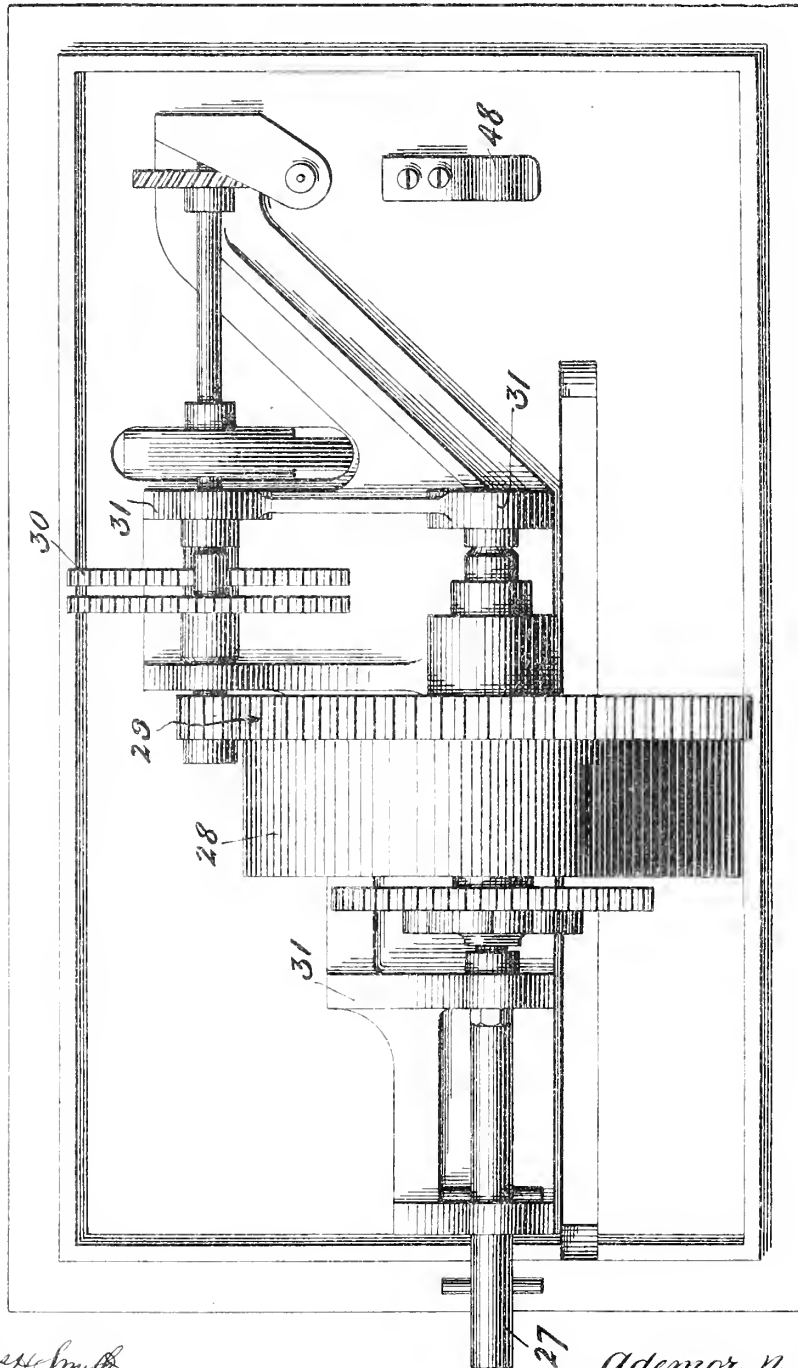
A. N. PETIT.
PHONOGRAPH.

APPLICATION FILED DEC. 19, 1903.

NO MODEL.

4 SHEETS—SHEET 1

FIG. 6.



Witnesses

Chas. H. Smith
J. Staib.

Inventor

Adenor N. Petit.
per Harold L. Russell
att'y.

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF WATERLOO, NEAR LIVERPOOL, ENGLAND.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 766,115, dated July 26, 1904.

Application filed December 19, 1903. Serial No. 185,786. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR NAPOLEON PETIT, a citizen of the United States of America, residing at 1 South View, Waterloo, near
5 Liverpool, in the county of Lancaster, England, have invented a certain new and useful Improved Phonograph, of which the following is a specification.

This invention refers to an improved construction of phonograph in which the traversing carriage is carried upon a longitudinally-fixed rod, while it is guided by that rod and also by a portion of the carriage entering a slot in the bed-plate, these means for carrying
15 and guiding the carriage being effective, and by reason of the two bearings at a distance apart the movement of the carriage is rendered easy and not subject to irregular motion. The carriage is further fitted with
20 an improved adjustment device for the stylus by which the latter can be placed into and out of operation with great ease and accuracy and without any special practice or skill or any liability of damage being caused to the
25 diaphragm, while the mechanism operates in such a manner that the carriage is brought into engagement with the lead-screw simultaneously with the bringing of the floating stylus-lever into operation. The lead-screw
30 is provided with a screw-thread of coarser pitch than that of the record, which is advantageous in view of the ease of manufacture of the screw. While it enables this to be
35 done, the invention comprises a gearing between the screw and the mandrel of the machine for reducing the speed of the screw-shaft to counteract the difference in pitch between the thread of the latter and the thread
40 of the record-cylinder.

The improved phonograph further presents a better arrangement of the speed-regulating gear than has heretofore obtained, a lever being provided and means for regulating the position of that lever so that the speed can
45 be controlled by a simple adjustment, and, further, the motor driving mechanism is constructed in such a manner that a wheel or other part which may be required to be repaired or renewed can be very readily re-

moved from the framework of the motor
50 without separating that framework, and thereby enabling parts which require to be renewed or repaired to be taken away from the framework by persons having but small amount of technical knowledge in such matters.
55

The invention consists in the construction and combinations of parts hereinafter described and claimed.

The improved phonograph is illustrated in the accompanying drawings.

Figure 1 is a plan view of the machine, Fig. 2 being an irregular transverse sectional
60 end view to illustrate the carriage and the mechanism for connecting the latter with the lead-screw and for bringing the stylus-lever
65 into operation, this view showing the carriage thrown out of gear. Fig. 3 is a similar view to that shown at Fig. 2, but illustrating the same parts when in gear. Fig. 4 is a detail
70 view showing in horizontal section the means by which the positions of a lever, hereinafter described, which is carried by the carriage are defined. Fig. 5 is a sectional end view of the
75 machine to illustrate the devices for controlling the speed of the machine and to show also the general arrangement of the clockwork-motor which is arranged beneath the
80 machine. Fig. 6 is an inverted plan view showing the said clockwork-motor beneath the bed-plate. Fig. 7 is a sectional front view, and Fig. 8 a side view, showing detail
85 construction of the devices hereinafter described for permitting of the removal of the arbors from the clockwork mechanism without removing the supporting-brackets or disturbing
85 that mechanism the removal of which is not called for.

Upstanding from the bed-plate 1 of the machine, Fig. 1, is a bracket in which is provided a bearing to support a cantaliver-shaft
90 3, upon which is fixed the usual taper mandrel 4, which receives the record-cylinder 5. The mandrel-shaft 3 is fitted with a pulley 6, driven by a belt from a suitable motor located beneath the bed-plate 1.
95

Parallel with the axis of the mandrel-shaft 3 I provide a fixed rod 7, supported by upstanding brackets 8 from the bed-plate 1, and

the rod 7 supports the carriage 9 by passing through its body, while it also forms one of the guides of the said carriage in its traverse. The second guide of the said carriage is formed

5 by a longitudinal slot made in the bed-plate 1, as will be seen at Figs. 2 and 3, and a projecting part or roller 10 on the base of the carriage, 9 takes into that slot, and so completes the guiding means for the carriage.

10 The carriage 9 is formed of an inverted-L-shaped casting, the upper horizontal arm being formed with a circular perforation to receive the vibrating diaphragm and the floating lever 11 with receiving-dome 12, from

15 which the trumpet is carried, the aforesaid arm of the carriage being so arranged, as shown, that the vibrating disk is held approximately vertically over the record in a horizontal position, while the downward arm extends to the base-plate, where it carries the

20 roller 10, and this downward arm is somewhat channel-shaped in its lower part to receive the mechanism for controlling the position of the stylus. The stylus-lever is carried on the usual weighted hinge-plate 13,

25 which when free keeps the stylus up to its work on the surface of the record 5 and enables it to follow the irregularities of the cylinder, as well as the undulations of the record-grooves.

30 On the inner side of the carriage 9 I provide a bell-crank lever 14, which is pivoted to the carriage 9 at 15, one of its arms terminating beneath the weighted hinge-plate 13,

35 while about the extremity of the other arm a portion of a screw-nut is fixed or formed which is adapted to engage with the lead-screw 16 when the said lever 14 is in such a position that the stylus is in contact with the record-

40 cylinder. The lead-screw is of course arranged parallel to the axis of the mandrel 4 and of the guide-rod 7 and is carried in the bearings 17, rising from the surface of the bed-plate. It will thus be seen that the rock-

45 ing of the lever 14 not only causes the screw-nut to be brought into mesh with the surface of the screw, but that at the same time and by the same movement the weighted hinge-plate 13 is allowed to descend and to bring

50 the stylus into contact with the record-surface.

The lever 14 must be caused to assume either of two positions—namely, that at Fig. 2 or that at Fig. 3—and in order to define those

55 two positions two indents are formed in the surface of the lower end of the lever, one or other of which is entered by a pointed pin 18, Fig. 4, which is carried by a spring 19 on the framework of the carriage, and in order

60 to actuate the lever 14 it is formed with a curved slot 20, Figs. 2 and 3, the slot being entered by a pin carried upon a lever 21, fulcrumed upon the guide-rod 7 and adapted to be rocked thereon by hand, so that when in

65 an upper position, as at Fig. 2, the machine

is thrown out of operation, and at the lower position, as at Fig. 3, the upper arm of the lever 14 is drawn away from the weighted hinge-plate 13, while the nut 22 is simultaneously brought into engagement with the lead-

70 screw 16. The thread-pitch of the lead-screw 16 being twice as great as the thread on the record-cylinder, the speed of rotation of the said lead-screw is reduced relatively to that

75 of the mandrel by means of toothed gearing, there being a toothed wheel 23 on the mandrel-shaft, driving an intermediate toothed wheel 24, mounted on a stud-axle supported by a bracket 25 on the base-plate, the latter

80 wheel driving a toothed wheel 26 on the lead-screw, as is shown at Fig. 1 and by dotted lines at Figs. 2 and 3.

The motor, located beneath the bed-plate 1, (see Figs. 5 and 6) is of the "spring-motor" type, which can be wound by a key-shaft 27,

85 as with ordinary clock mechanism, and the various wheels and working parts—such as the spring-drum 28, the gearing 29 30—being carried by inverted brackets 31, fixed to the said bed-plate.

90 In such motors, as before stated, it is advantageous to permit of the removal of any single arbor, together with the wheel or wheels which that arbor carries, without disturbing or taking to pieces the framework 31, which

95 carries the arbors, and without disturbing any of the other arbors or wheels which it is not required to remove at the time. In order to permit of this being done and referring to

100 Figs. 7 and 8, each arbor is made of less length than the distance between the two brackets by which it is supported. Thus in the instance illustrated in the latter figures the arbor 49 is less in length than the distance between the two brackets 31 31, and the ends of

105 the arbor 49 are carried in bushes 32, (see also Fig. 5,) which bushes are capable of being slid longitudinally in the brackets composing the framework of the motor, so that on sliding two of such bushes 32 apart the arbor is

110 left entirely free and can be removed from the bracket without giving the arbor any endwise motion and without disturbing the remainder of the mechanism.

The bushes 32 are made of such length as

115 to slide onto the ends of the arbors, and thus form the bearings, and they are retained in position, as shown at Fig. 7, by any suitable means—such, for instance, as by set-screws, one of which is shown at Fig. 8. This mode

120 of removal of the arbors which carry the wheels is very important—that is, being able to withdraw the arbor without giving it any endwise motion whatever—because where such an arbor carries several wheels if it had to be given

125 any endwise motion it would sometimes be necessary to remove an adjacent arbor, for instance, which carried engaging wheels, and so defeat the object which has been had in view in this construction—namely, that of remov-

130

ing an arbor without giving it endwise motion and without disturbing adjacent parts or the framework by which it is carried.

The governor of the motor is arranged above the bed-plate 1 of the machine and may be of usual type, consisting of a shaft 33, the upper end being carried in an arched bearing-bracket 34, while the lower end passes through the bed-plate, is supported on a bracket 35, and is formed with a screw-thread 36, gearing with a worm-wheel 37 on the driven shaft of the motor, by which the governor-shaft 33 is revolved. To the upper end of the shaft 33 is fixed the ends of two springs 38, carrying governor-balls 39, the lower ends of the springs being attached to a sleeve 40, free to rise and fall, as the balls vary in their distance from the axis of the governor-shaft according to the speed of rotation. The sleeve 40 has a flanged disk 41 fixed or formed with it, and this disk is acted upon frictionally by the bearing-point 42 of the bracket-lever 43. The bracket-lever 43 is fulcrumed at 44 on a bracket from the base-plate 1, and that end of the lever beyond the fulcrum and opposite to the bearing-point or friction-pad 42 extends over a distance-screw 45 in the bed-plate, by which the amount the outer end of the lever 43 can be depressed is regulated.

46 represents two finger-keys by which the lever 43 may be rocked, and the latter is formed with a downwardly-extending arm 47, against which a spring 48, beneath the bed-plate, acts, and the spring is so bent as to cause the lever 43 to either press against the friction-plate 41 of the governor or against the head of the distance-screw, according as to which way the lever is rocked. By depressing the outer end of the lever, and so causing it to be brought against the distance-screw 45 and held there by the spring 48, the friction-pad 42 is removed from the friction-disk 41, and the latter is free to rotate. As it rotates the governing-ways 39 separate from the center and lift the friction-disk 41 until its surface is again in contact with the friction-pad 42 on the end of the lever. The friction between the friction-disk and friction-pad varies according to the amount the pad is depressed, so that by altering the angle of the lever by means of the regulating-screw 45 the speed of the motor can be varied at will.

To set the machine in operation, supposing the carriage parts to be in the position as at Fig. 2 and the governing-lever 43 in the position as at Fig. 5, the lever 43 is rocked on its fulcrum 44 until its outer end is in contact with the distance-screw 45, which will allow the motor to commence working, so revolving the mandrel-shaft and through the wheels 23, 24, and 26 the lead-screw 16. At the same time the lever 21 should be turned from the position shown at Fig. 2 to the position shown at Fig. 3, causing the lever 14 to be rocked from one position to the other and the regu-

lating-point 18, Fig. 4, to pass from one indentation to the other, and thereby accurately define the position of the lever 14. The machine being thus in operation, the speed can be regulated with the greatest nicety by adjusting the distance-screw 45. Upon the stylus having reached the end of the record the machine is instantly stopped by pressure of the finger upon that finger-key 46 which is on the record side of the lever 43, causing that lever to be rocked into the position shown at Fig. 5, and so allowing the bend of the spring 48 to press the friction-pad 42 of the lever against the friction-disk 41 of the governor, which it does with sufficient strength to stop the machine, and this stoppage, if desired, may be effected at any point of the working.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In phonographs the combination with a horizontal bed-plate, having a longitudinal guideway therein, a horizontal revoluble mandrel-shaft for carrying the record-cylinder, a bearing-bracket from the bed-plate to carry the said shaft by one of its ends, a motor located beneath the bed-plate, means for driving the mandrel-shaft from the motor, a horizontal screwed traversing shaft carried in bearings from the bed-plate, means for revolving the latter shaft from the mandrel-shaft, and mechanism for stopping or freeing the motor and for regulating its speed; of an inverted-L-shaped traversing carriage having an aperture in its upper horizontal arm extending above the mandrel for carrying the receiving-dome, vibrating diaphragm, weighted hinged plate, floating lever and stylus, brackets upstanding from the bed-plate, a fixed guide-rod supported by the said brackets and passing through the downward arm of the carriage to form one longitudinal guide for the latter, a projecting part on the downward arm of the carriage to enter the guideway in the bed-plate to form a second guide for the carriage, a bell-crank lever pivoted to the carriage, one arm terminating beneath the weighted hinged plate, and a screw-threaded half-nut at the extremity of the other arm of the lever to engage with the traversing screw, and means for rocking the bell-crank lever to simultaneously move the screw half-nut from engagement with the traversing screw and to raise the hinged plate and stylus-lever away from the record, or vice versa, substantially as set forth.

2. In phonographs, the combination with a horizontal bed-plate, a longitudinal guideway therein, a horizontal revoluble mandrel-shaft, a bearing-bracket from the bed-plate to carry the said shaft, a tapering mandrel carried by the mandrel-shaft to receive the sound-record cylinder, a motor located beneath the bed-plate, means for driving the mandrel-shaft from the motor, a horizontal screwed traversing shaft carried in bearings from the bed-

plate, means for revolving the latter shaft from the mandrel-shaft, and mechanism for stopping or freeing the motor and for regulating its speed; of an inverted-L-shaped
 5 traversing carriage having an aperture in its upper horizontal arm extending above the mandrel for carrying the receiving-dome, vibrating diaphragm, weighted hinged plate, floating lever and stylus, brackets upstanding
 10 from the bed-plate, a fixed guide-rod supported by the said brackets at each end and passing through the downward arm of the carriage to form one guide for the latter, a projecting part on the downward arm of the
 15 carriage to engage in the guideway in the bed-plate to form a second guide for the carriage, a bell-crank lever 14 pivoted to the carriage, one arm terminating beneath the weighted hinge-plate, and a screw-threaded half-nut at
 20 the extremity of the other arm of the lever to engage with the traversing screw, an operating-lever 21 pivoted on the carriage, a curved slot in the lever 14 and a pin on the lever 21 entering the said slot for rocking the lever 14 by
 25 the operation of the lever 21 to simultaneously lift the stylus-lever away from the record and the half-nut away from the screw-shaft, or vice versa, and a spring-pin carried by the carriage and bearing on the face of the lever
 30 14, and two indentations in the said face of the latter lever into the one or the other of which the pin may enter to define the two positions of the said lever, substantially as set forth.

3. In phonographs, the combination with a
 35 horizontal bed-plate, a horizontal revoluble mandrel-shaft, a bearing-bracket from the bed-plate to carry the said shaft by one end thereof, a tapering mandrel carried by the mandrel-shaft to receive the sound-record
 40 cylinder, a horizontal screwed traversing shaft carried in bearings from the bed-plate, gearing for revolving the latter shaft from the mandrel-shaft, a traversing carriage, a receiving-dome, vibrating diaphragm, weighted
 45 hinged plate, floating lever and stylus carried by the traversing carriage, longitudinal guides for the said carriage, and mechanism for engaging or disengaging the carriage from the traversing screw and for engaging or
 50 disengaging the stylus-lever to or from the record-cylinder; of a motor located beneath the bed-plate, a pulley on the driven shaft of the motor, a belt from the said pulley passing over a pulley on the mandrel-shaft for
 55 revolving the latter, a vertical governor-shaft passing through the bed-plate, gearing connecting the vertical shaft with the driven shaft of the motor for revolving the governor-shaft, a sleeve on the governor-shaft above
 60 the bed-plate, and connections from the sleeve to the centrifugally-acting balls to lift the sleeve on the shaft as the speed increases, a disk on the sleeve, a three-arm lever pivoted on the bed-plate, a friction-stud 42 on one
 65 arm of the lever to act on the upper surface

of the sleeve friction-disk, an adjustable distance-screw in the bed-plate beneath the tail-arm of the lever 43 to regulate the distance to which the friction-stud 42 may be removed from the friction-disk, and a bent spring on
 70 the bed-plate to act against the third arm of the lever to cause the friction-stud 42 to be pressed on the friction-disk or to cause the tail-lever to be pressed upon the distance-screw 45, substantially as described. 75

4. In phonographs, the combination with a hinged bed-plate having a longitudinal guide-slot therein, a horizontal revoluble mandrel-shaft to receive the sound-record cylinder, a bearing-bracket from the bed-plate to carry
 80 the said shaft by one end thereof, a motor located beneath the bed-plate, means for driving the mandrel-shaft from the motor, a horizontal traversing shaft carried in bearings from the bed-plate, a screw-thread on the traversing
 85 shaft of greater pitch than the thread of the record-cylinder, toothed gearing connecting the traversing shaft with the mandrel-shaft and calculated to reduce the speed of the traversing shaft proportionally to the difference
 90 of pitch of thread between the traversing shaft and the record-cylinder, and mechanism for stopping or freeing the motor and for regulating its speed; of a traversing carriage, a receiving-dome, weighted hinged plate, floating
 95 lever and stylus, carried by the traversing carriage, a fixed horizontal guide-rod carried by brackets from the bed-plate and passing through the carriage to support the latter and to form one longitudinal guide therefor, a
 100 roller mounted on a vertical axis at the base of the traveling carriage and entering the guide-slot in the bed-plate to form a second guide for the carriage, and mechanism for engaging or disengaging the carriage from the traversing
 105 screw and for engaging or disengaging the stylus-lever to or from the record-cylinder, substantially as described.

5. In phonographs, the combination with a horizontal bed-plate having a longitudinal
 110 guide-slot therein, a revoluble horizontal cantaliver-shaft, a bearing-bracket upstanding from the bed-plate to support the cantaliver-shaft by one end thereof, a tapering mandrel carried by the cantaliver-shaft to receive the sound-record
 115 cylinder, a motor located beneath the bed-plate, a pulley on the driven shaft of the motor, a pulley on the mandrel-shaft, a driving-belt connecting the two pulleys for revolving the mandrel-shaft,
 120 means for governing the speed of the motor, a traversing screw-shaft parallel to the mandrel-shaft, and means for rotating the said screw-shaft; of an inverted-L-shaped traveling carriage, a receiving-dome, a vibrating
 125 diaphragm, weighted hinge-plate, floating lever and stylus carried by the horizontal arm of the carriage, and located vertically above the mandrel, a fixed guide-rod supported from the bed-plate parallel to the
 130

screw-shaft and passing through the downward arm of the carriage to form one guide for the latter, a projecting part on the downward arm of the carriage to enter the guide-slot of the bed-plate, a bell-crank lever 5 pivoted to the carriage, one arm thereof terminating beneath the weighted hinged plate and a half screw-nut carried at the extremity of the other arm of the lever to engage with 10 the traversing screw, and mechanism carried by the carriage for adjusting the position of the lever 14 to simultaneously move the half screw-nut from engagement with the traversing screw and to raise the hinged plate and 15 stylus-lever away from the record, or vice versa, substantially as set forth.

6. In phonographs, the combination with a mandrel-shaft to carry the sound-record cylinder, a traversing carriage for carrying the 20 recorder or reproducer, guides for the carriage, a traversing screw for the traversing carriage, gearing connecting the traversing

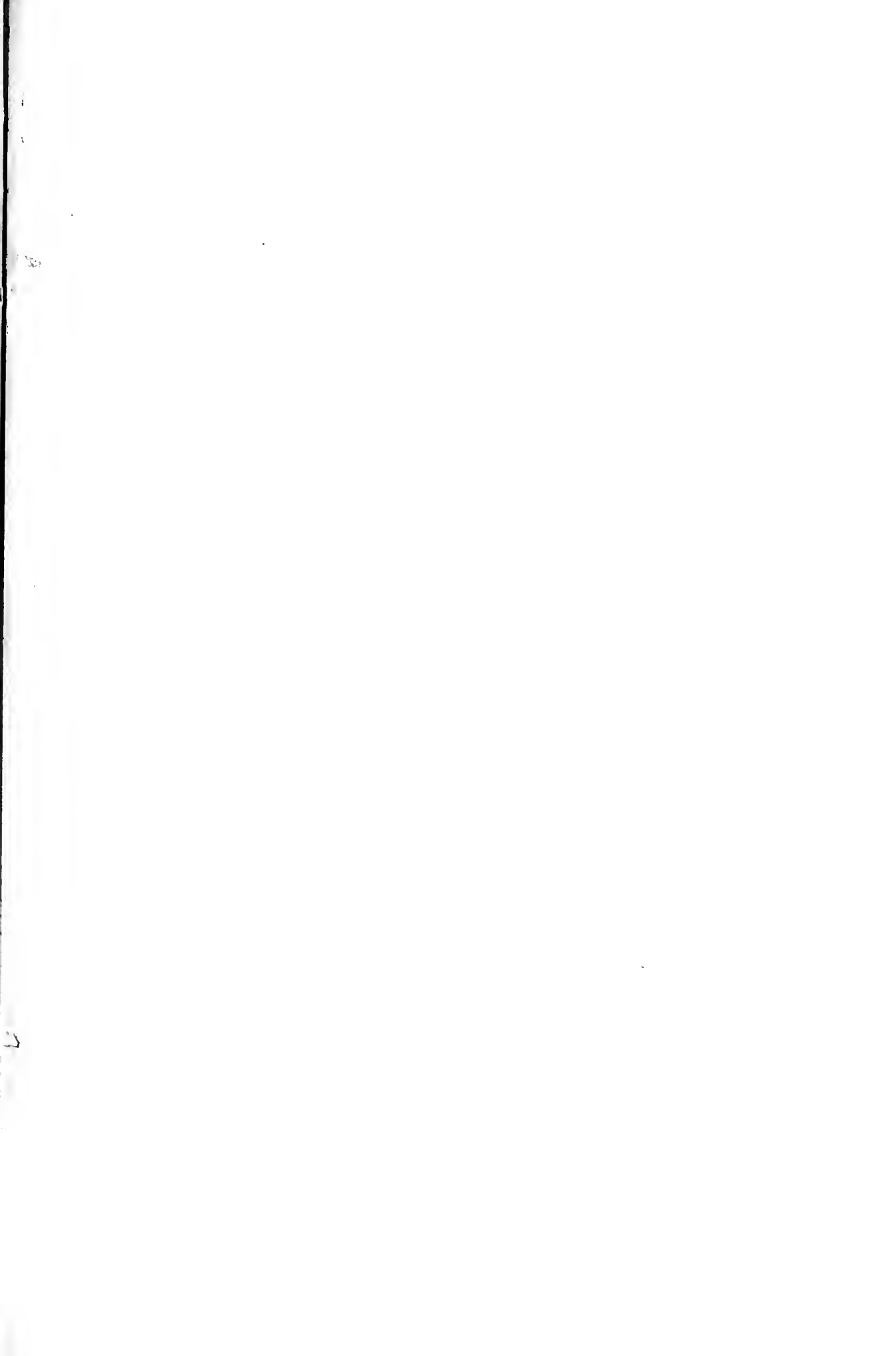
screw with the mandrel-shaft for operating the latter, and a bed-plate above which the aforesaid parts are supported and carried; of 25 a spring-motor located beneath the bed-plate, a metal framework fixed beneath the bed-plate, pendent arms from the framework, arbors to carry the gearing each of the said 30 arbors being of less length than the distance between the pendent arms between which it is carried, an aperture in the end of each of the arms, an adjustable bush located in each aperture to receive the ends of the arbors and to form bearings therefor, the said 35 bushes being capable of endwise adjustment to permit of the arbors being removed and replaced in a direction parallel to their axes, and means for securing the bushes in position, substantially as set forth.

ADEMOR N. PETIT.

Witnesses:

CLARENCE H. WIMSHURST,
JOHN J. CALLIN.



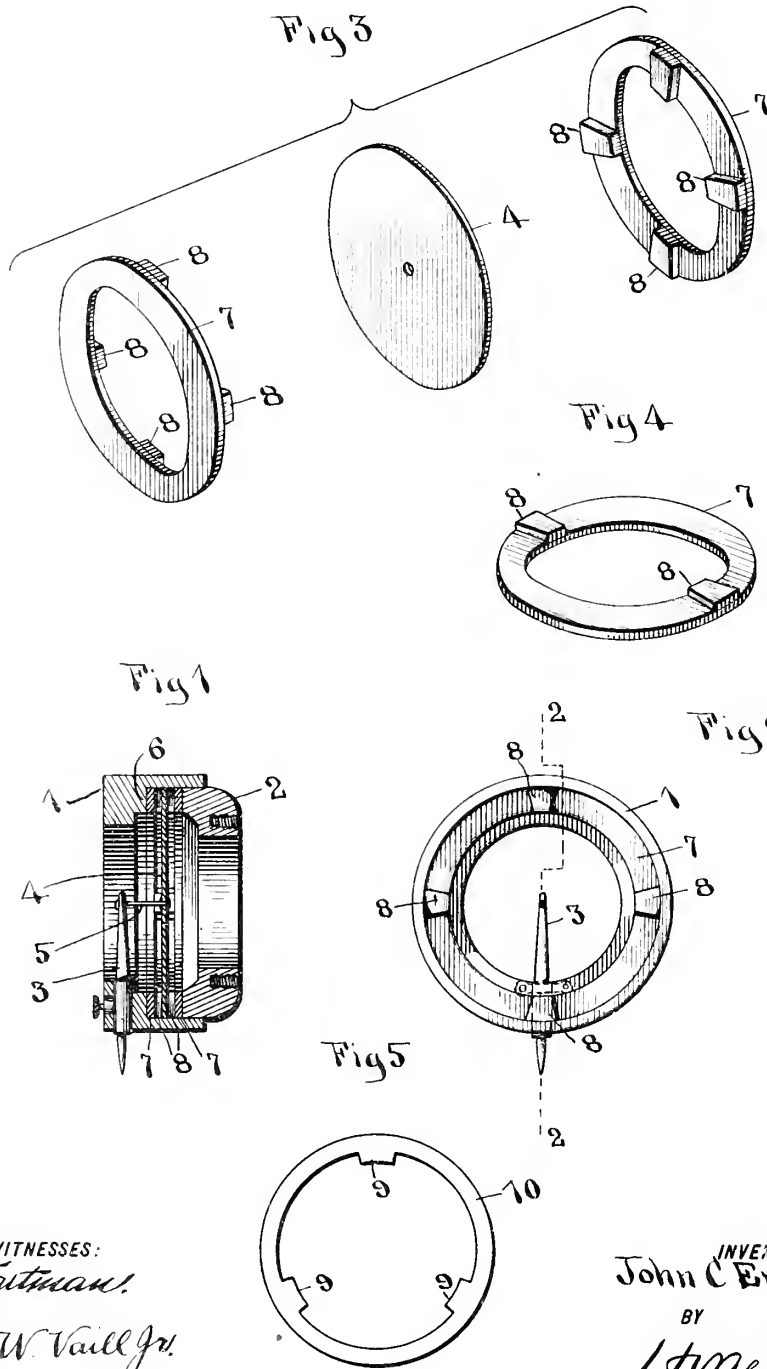


No. 766,141.

PATENTED JULY 26, 1904.

J. C. ENGLISH.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED OCT. 21, 1903.

NO MODEL.



WITNESSES:
H. G. Hartman
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UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 766,141, dated July 26, 1904.

Application filed October 21, 1903. Serial No. 177,859. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full and complete disclosure.

This invention relates to certain improvements in sound-boxes for talking-machines, and has for its object to provide a construction which will decrease the cost of manufacture and improve the volume and quality of the reproduction. In sound-boxes of this class it is usual to make the diaphragm of mica, and heretofore to obtain the best results it has been the practice to employ only selected pieces of mica and to confine the same at the peripheral portion between washers, this arrangement being found to produce the best results in reproducing sounds. Owing to the fact that only selected pieces of mica were found available in the construction of sound-boxes of this class, it is obvious that there has been considerable waste of material; and one of the objects of this invention is therefore to provide a construction whereby pieces of mica heretofore found unavailable for this purpose may be employed with equal success, and thus lessen the cost of the sound-box.

While the above is one of the main features of my invention, it also consists of the general arrangement and structure to improve the volume and quality of the reproduction, as hereinafter described.

In the accompanying drawings, which show a preferred embodiment of my invention, Figure 1 is a sectional elevation of a sound-box embodying my invention and taken about the line 2 2 of Fig. 2. Fig. 2 is a rear elevation of the front section of the sound-box frame with the diaphragm removed and the front washer in place. Fig. 3 is a perspective view of the diaphragm and the front and rear washers grouped in the relation they occupy when assembled. Fig. 4 is a perspective view of another form of washer that may be em-

ployed. Fig. 5 is a plan view of still another form of washer that may be employed.

Referring to said drawings, 1 and 2 designate the sections of the sound-box, 3 the stylus-bar, and 4 the diaphragm joined to the stylus-bar by pins 5, said parts, with the exception of the manner of mounting the diaphragm, being of ordinary construction. The section 1 is provided interiorly with an annular seat or shoulder 6, between which and the end of the section 2 the washers and diaphragm employed in the embodiment of my invention illustrated are situated.

In accordance with the broad principle of my invention I employ a support for the side of the diaphragm that contacts circumferentially with only a portion of the face thereof, as distinguished from an unbroken or continuous support. The support for sound-box diaphragms are usually at the edges thereof and are circular, so that the diaphragm is supported and clamped around its entire edge, whereas by my invention the diaphragm is clamped so that a portion or portions of its edge is free and unsupported. I have found it convenient to have a support of this kind on opposite sides of the diaphragm and also to employ a plurality of sets of such supports, although my invention is not limited thereto, as it embraces, broadly, supporting a diaphragm by a clamping face or support that contacts with only a portion of the side face thereof, that another portion or portions are free and unsupported instead of having the clamping faces or supports unbroken and extend entirely around the diaphragm. By thus supporting the diaphragm I have found that I may not only employ a grade and quality of mica heretofore unavailable for the purpose, but that independent of the material of which the diaphragm is composed the clearness, distinctness, and naturalness of the volume and quality of tone is improved.

The preferred embodiment of my invention is one in which the edges of the diaphragm are clamped and supported at intervals, so that portions of the edges are unsupported, and it is manifest that various constructions

may be employed for this purpose; but as a simple and convenient arrangement I have shown washers 7, having raised portions or faces 8. The washers 7 are arranged between and seated on the shoulder 6 and end of section 2, with the raised portions 8 opposing and adjacent each other and with the diaphragm interposed and clamped between the latter.

In Figs. 1, 2, and 3 the washers 7 are each provided with four raised portions or clamping-surfaces 8, and, as shown by Figs. 1 and 3, when assembled in operative position these portions 8 are opposite each other to clamp the edges of the diaphragm between them, although the number of raised portions may be varied—for instance, by using two, as shown in Fig. 4. The clamping portions 8 alone may be made of paper and of a separate piece attached to the washer 7 proper, as shown, although other material may be employed, or obviously the washer and clamping portions may be made integral.

Fig. 5 shows another construction of washer for supporting the diaphragm in accordance with my invention and comprises a ring 10, fitting within the diaphragm-chamber formed between the seat 6 and the end of the section 2. This ring is provided with a plurality of lugs or projections 9, extending inwardly in the plane of the ring 10 from the inner edge thereof. The diameter of the diaphragm used in connection with this form of washer is about equal to the inner diameter of the ring 10, so that the edge portion of the side faces thereof are clamped between the lugs or projections 9. In thus mounting and clamping the diaphragm in position the sides of the same are held and supported at its edge portion at intervals only, and I have found in practice that not only by this arrangement am I enabled to employ with equal results a grade and quality of mica heretofore discarded and retain in a high degree the clearness, distinctness, and naturalness of the volume and quality of tone, and thereby effect a saving in the cost of making the sound-boxes, but in addition this construction in itself improves the volume and quality of tone in this regard, and therefore except in the claims, wherein the employment of a different grade of mica is made a feature of this construction, my invention is not limited thereto, as diaphragms of selected pieces of mica and of other material may be mounted in accordance herewith with improved and advantageous results.

My invention is to be distinguished from that class of sound-boxes in which the diaphragm is supported from its edges as distinguished from its sides, for instance, as it has been proposed, by employing teeth or serrations extending outwardly from the outer edge or boundary of and in the plane of the diaphragm proper, which teeth or serrations are suitably clamped. In this class of sound-

box the supports do not contact with the sides of the diaphragm, but merely clamp these projecting teeth or serrations, whereas in my invention the sides of the diaphragm proper are clamped between the supports.

Having thus described my invention, what I claim to be new, and desire to protect by Letters Patent of the United States, is—

1. In a sound-box, a diaphragm, and means for supporting circumferentially, as distinguished from radially, only a portion of the side face thereof, and leaving the remaining portion of said diaphragm free and unsupported.

2. In a sound-box, a diaphragm and a support therefor, contacting circumferentially, as distinguished from radially, with only a portion of the side face thereof, and leaving the remaining portion of said diaphragm free and unsupported.

3. In a sound-box, a diaphragm, and supports situated on opposite sides thereof and contacting circumferentially, as distinguished from radially, with only a portion of the side faces thereof.

4. In a sound-box, a diaphragm, and opposing supports situated on opposite sides thereof and each contacting circumferentially, as distinguished from radially, with only a portion of the side face thereof.

5. In a sound-box, a diaphragm, and opposing supports of substantially the same area situated on opposite sides thereof, and contacting circumferentially, as distinguished from radially, with only a portion of the side faces thereof.

6. In a sound-box, a diaphragm, and means for supporting at the sides and circumferentially, as distinguished from radially, only a portion of the edge portion thereof.

7. In a sound-box, a diaphragm, and supports situated on opposite sides thereof and contacting circumferentially, as distinguished from radially, with only a portion of the edge portion thereof.

8. In a sound-box, a diaphragm, and means for clamping circumferentially, as distinguished from radially, only a portion of the side faces thereof.

9. In a sound-box, a diaphragm, and means for clamping at the sides and circumferentially, as distinguished from radially, only a portion of the edge portion thereof.

10. In a sound-box, a diaphragm, having its side faces supported at intervals.

11. In a sound-box, a diaphragm, and segmental supports contacting with the side faces thereof.

12. In a sound-box, a diaphragm, and a plurality of supports contacting with each of the sides thereof.

13. In a sound-box, a diaphragm, and a plurality of opposing supports situated on opposite sides of the diaphragm, and between which the latter is clamped.

14. The combination with the sections of a sound-box, of a plurality of clamping-faces on opposite parts thereof, and a diaphragm situated and clamped between said faces.

5 15. In a sound-box, washers having projecting clamping-faces, and a diaphragm situated and clamped between the same.

10 16. In a sound-box, washers having raised portions located adjacent each other, and a diaphragm clamped between said raised portions.

15 17. In a sound-box, a diaphragm, and means connecting said sound-box and diaphragm and contacting circumferentially, as distinguished from radially, with only a portion of the side face thereof.

20 18. In a sound-box, a diaphragm, and means for supporting circumferentially, as distinguished from radially, only a portion of the side face thereof, said means forming the sole connection between said sound-box and diaphragm.

19. In a sound-box, a diaphragm, means for

supporting circumferentially, as distinguished from radially, only portions of the opposite side faces thereof, said means forming the sole connection between said sound-box and diaphragm. 25

20. In a sound-box, a diaphragm, and portions of said sound-box on opposite sides of said diaphragm engaging circumferentially, as distinguished from radially, only portions of the side faces thereof, and forming the sole connection between said sound-box and diaphragm, 30

21. In a sound-box, a diaphragm having a portion of its edge free and unsupported, and means for supporting circumferentially, as distinguished from radially, the remaining edge portion thereof. 35

In witness whereof I have hereunto set my hand this 15th day of October, 1903. 40

JOHN C. ENGLISH.

Witnesses:

HARRY COBB KENNEDY,
FREDK. C. EBERHARDT.

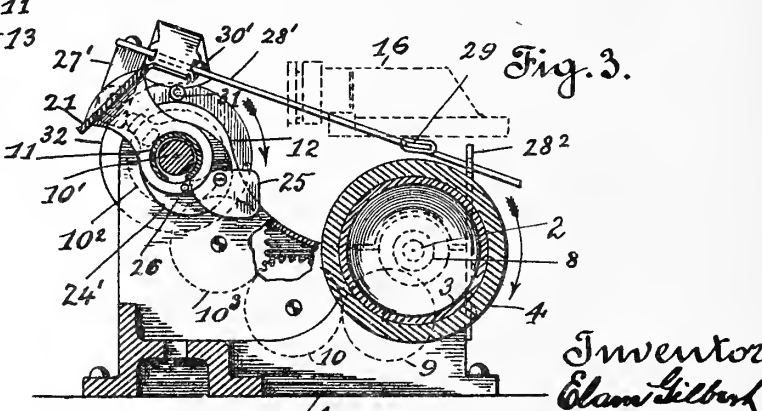
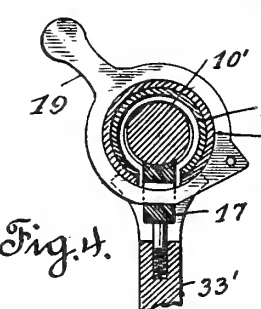
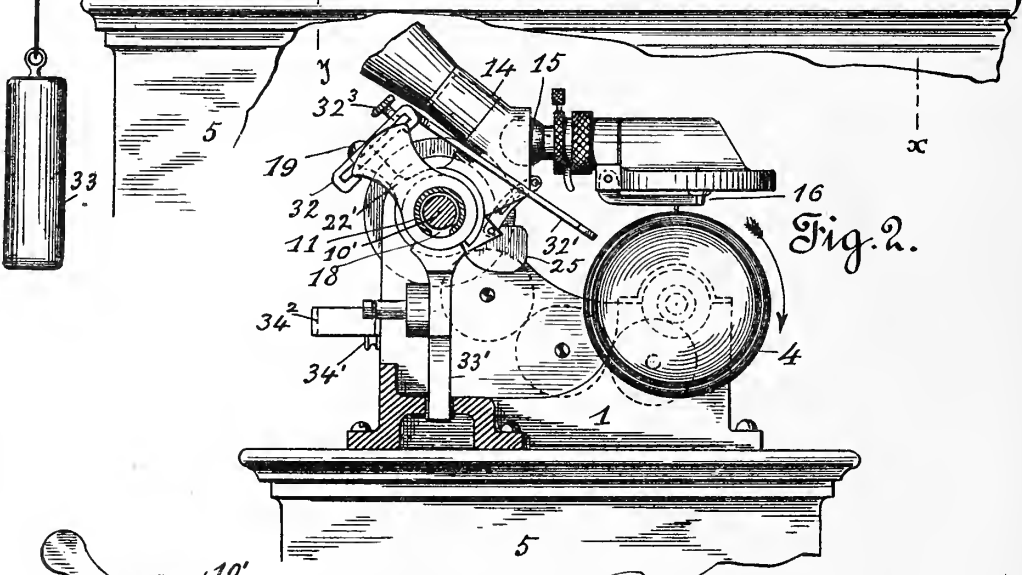
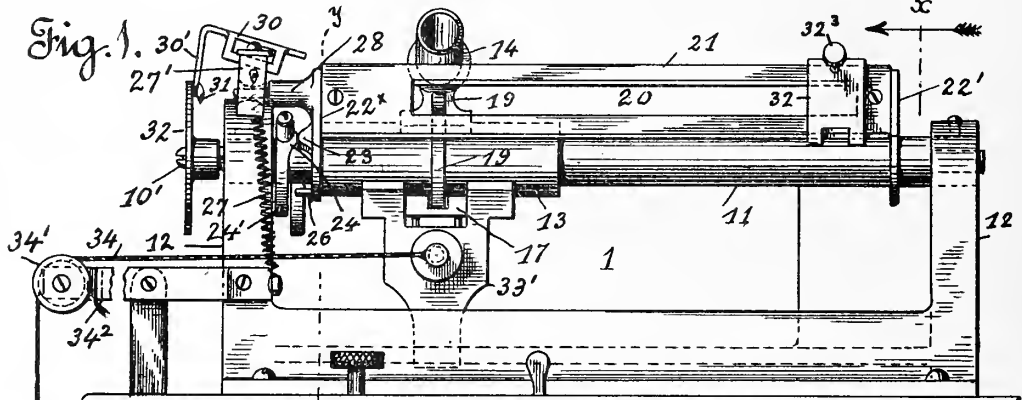


E. GILBERT.
ATTACHMENT FOR GRAPHOPHONES.

APPLICATION FILED JULY 27, 1903.

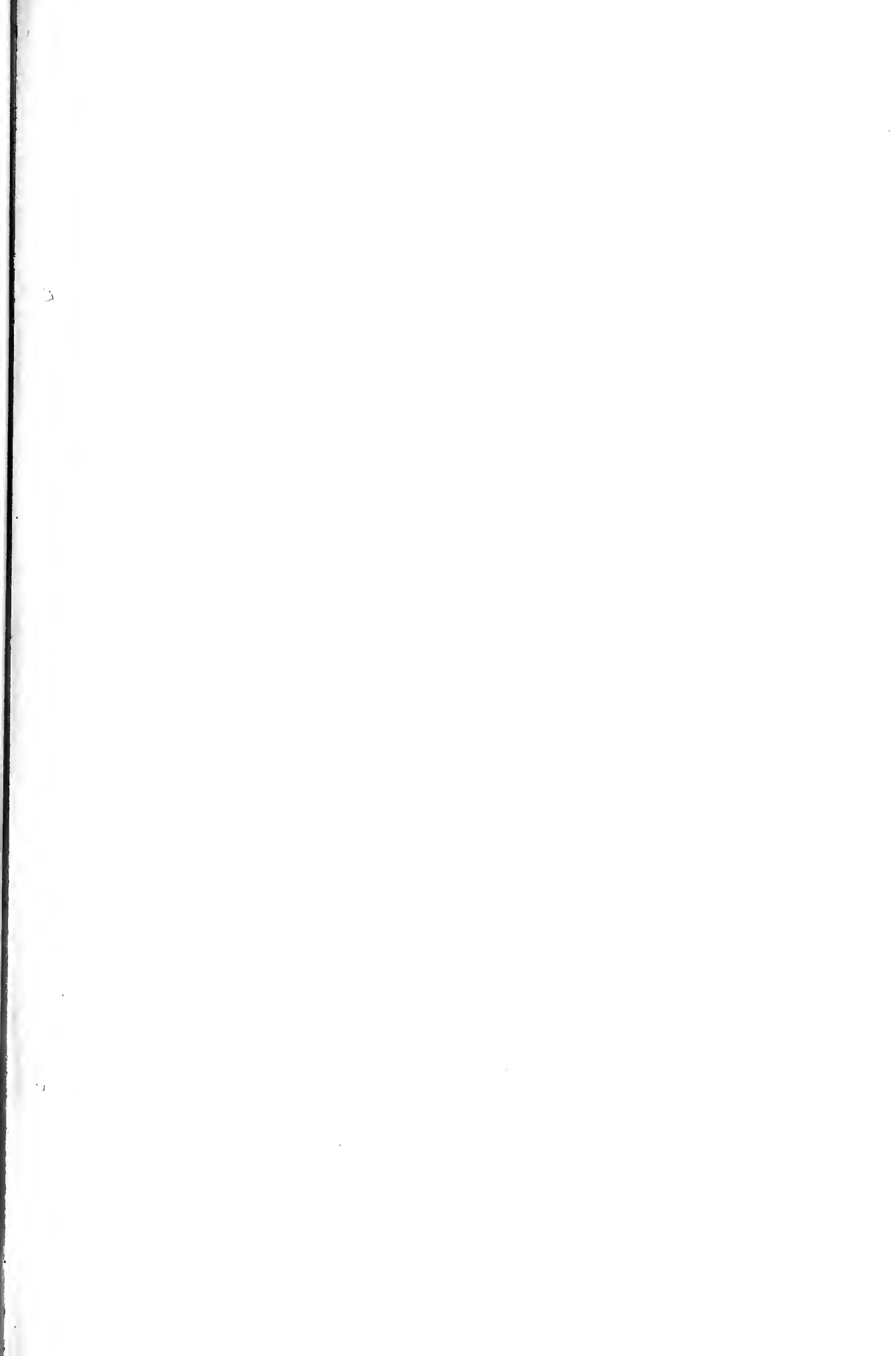
NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.
W. H. D. ...
 Charles E. ...

Inventor.
 E. Gilbert
 by *N. A. ...*
 His atty.



E. GILBERT.
ATTACHMENT FOR GRAPHOPHONES.

APPLICATION FILED JULY 27, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

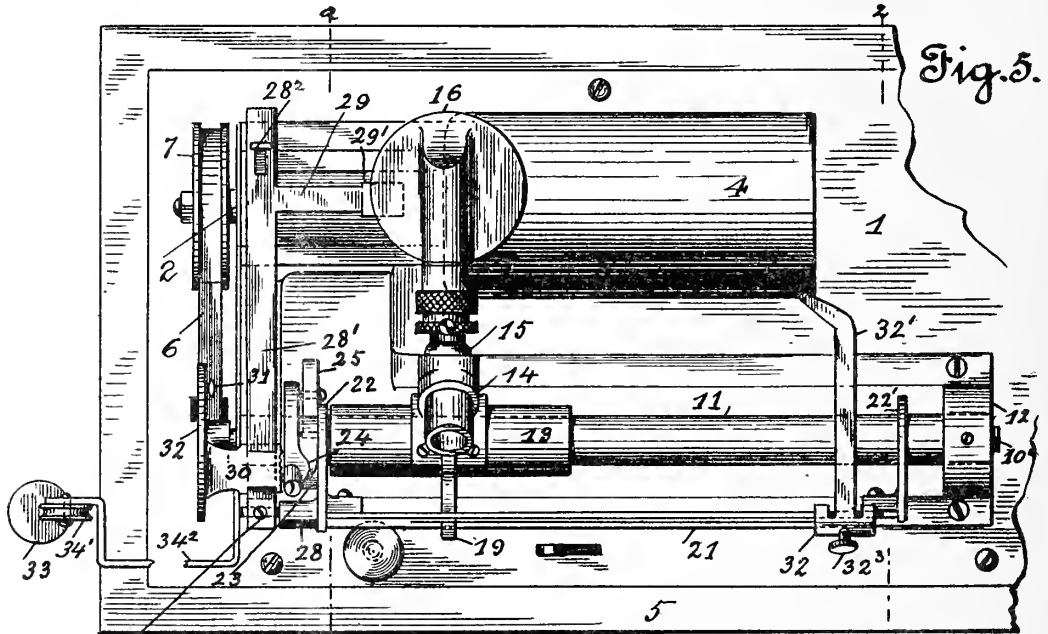


Fig. 5.

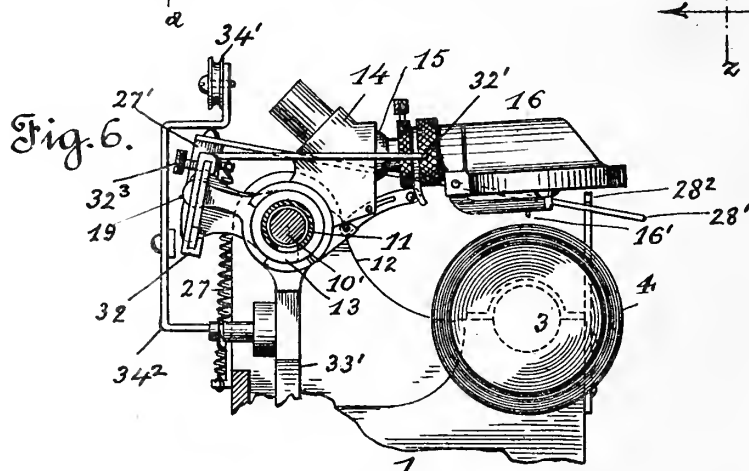


Fig. 6.

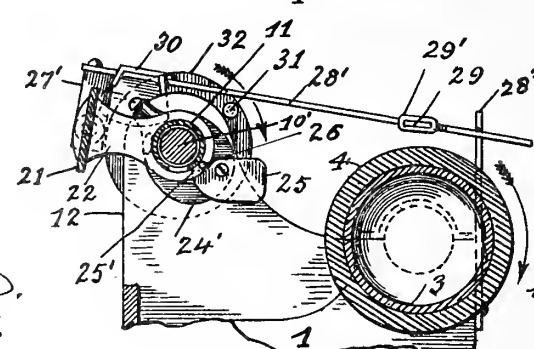


Fig. 7.

Witnesses.

Steffenwerde
Halter Dr. Canal.

Inventor.
Clara Gilbert
by *N.A. O'Connor*
his atty.

UNITED STATES PATENT OFFICE.

ELAM GILBERT, OF PORTLAND, OREGON.

ATTACHMENT FOR GRAPHOPHONES.

SPECIFICATION forming part of Letters Patent No. 766,341, dated August 2, 1904.

Application filed July 27, 1903. Serial No. 167,107. (No model.)

To all whom it may concern:

Be it known that I, ELAM GILBERT, a citizen of the United States, residing at Portland, county of Multnomah, State of Oregon, have invented certain new and useful Improvements in Attachments for Graphophones; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention comprises means hereinafter claimed for attachment to an ordinary graphophone, phonograph, or other cylinder-record-reproducing machine by the use of which the record may be repeated or replayed any number of times during the working of the machine without requiring an attendant to throw or place the reproducing means into operation when the same has to be restored to its starting position after having reproduced the record, the invention involving means whereby the reproducer mechanism is automatically raised or lifted clear of the record after having traversed the length thereof, returned to its starting-point, and automatically lowered when returned to its normal position, in order to proceed immediately to move inward for the purpose of repeating the record.

In order to comprehend the invention, reference should be had to the accompanying sheets of drawings, wherein—

Figure 1 is a front view in elevation, partly broken away, of an ordinary graphophone, illustrating the position of the slide-plate as raised to lower the reproducer mechanism or place the needle of the said reproducer onto the record, the device for the slide or shiftable plate being about to disengage itself from the disk which elevates the same to raise the said slide or shiftable plate. Fig. 2 is a vertical cross-sectional end view disclosing the parts as positioned in Fig. 1 of the drawings, said section being on line *x x* of Fig. 1. Fig. 3 is a similar view taken on line *y y*, Fig. 1 of the drawings, the reproducer-head being illustrated by dotted lines as resting upon the supporting-arm which receives the same when lowered to place its needle onto the record for the repeating thereof. Fig. 4 is an enlarged detail cross-sectional view through the carrier for propelling the reproducer, the

sleeve which supports the carrier, and the worm feed-shaft, said view illustrating the pawl for engaging with the worm feed-shaft. Fig. 5 is a broken top plan view of the mechanism contained in Fig. 1 of the drawings. Fig. 6 is a vertical cross-sectional end view taken on line *z z*, Fig. 5 of the drawings, illustrating the position of the parts when the reproducer mechanism is raised to lift its needle clear of the record; and Fig. 7 is a similar view taken on line *a a* of Fig. 5 of the drawings.

The numeral 1 designates the bed of an ordinary "graphophone," and 2 the usual record-shaft, which shaft carries the mandrel 3 for the record 4 to be reproduced. This shaft is driven from the operating mechanism (not shown) located within the case 5 by means of the belt 6, which works over the belt-wheel 7, attached to the outer end of the said shaft 2. To this shaft is also secured the pinion 8, which pinion meshes with gear 9. This gear meshes with the gear 10, which in turn engages with the gear 10', engaging with the gear 10", attached to the worm feed-shaft 10'. Fig. 3 of the drawings. The worm feed-shaft works within an inclosing sleeve 11, secured between the brackets 12.

Upon the fixed sleeve 11 is slidably mounted the traveler 13, which carries the reproducer-arm 14. To said arm is connected by a universal joint 15 the reproducer-head 16. The traveler 13 is moved longitudinally by means of the pawl 17, carried thereby, engaging with the threads of the worm feed-shaft, which pawl works through a longitudinal opening 18 in the under face of the sleeve 11 and is thrown into and out of engagement with the worm feed-shaft by means of the lever 19.

The pawl-actuating lever 19 works within the slotted portion 20 of the slide-plate 21, which plate is supported by the brackets 22 22', loosely mounted upon the sleeve 11. By reason of the loose connection between the brackets 22 22' and the sleeve 11 the plate 21 is not only permitted longitudinal play, but also vertical movement—that is, it may be raised and lowered by the hereinafter-described mechanism.

At the outer face of the bracket 22 is lo-

cated a shoulder 23, which shoulder works against the incline 24 of the collar 24', rigidly secured to the outer end portion of the fixed sleeve 11.

5 To the collar 24' is hinged a depending cam 25, the projecting finger 25' of which when the said cam is in its normal position lies immediately beneath the fixed sleeve 11. This cam is engaged by a pin or stud 26, secured to and projecting from the outer face of the bracket 22, the purpose of the cam being to hold the slide-plate 21 in its raised position until the said plate is moved inward to release the pin or stud 26 from its engagement therewith. The moment the pin or stud 26 is released from engagement with the cam 25 the plate 21 is lowered by the tension of the spring 27, which spring forms connection between the bed 1 of the machine and the head-block 27', secured to the projecting portion 28 of the bracket 22. To this block 27' is connected one end of a supporting-plate 28', the opposite end of which is secured to an upright 28², projecting upwardly from the bed 1. The plate 28' has attached thereto an inwardly-extending arm 29, which when the traveler 13 is returned to its starting position receives and upholds the reproducer-head 16 when thrown downward by the uplifting of the plate 21. By this means the reproducing-needle 16' is held in line with the surface of the record 4, so as to enter thereon as the head is moved inward by the action of the traveler 13, being thus prevented from being damaged by impinging against the end edge of the record. This supporting-arm is necessary inasmuch as the records vary as to inside diameter, which variation of diameter prevents the records slipping onto the mandrel the proper distance—*i. e.*, some records will slip farther onto the mandrel than others. Were it not for this supporting-arm the head of the reproducer would drop or fall too low in case of a record not going onto the mandrel the proper distance or far enough for the needle of the head to bear onto the surface of the record when the head is lowered, the result being in such case that as the reproducer-head is moved inward for the reproduction of the record the needle will be brought against the edge of the record and the strain or pressure thereon will tend to break the needle or stop the working of the machine. With the employment of the supporting-arm such occurrence is prevented, as the head is held in proper position for the needle to move onto the surface of the record as the reproducer-head is moved inward. To lessen the impact blow of the reproducer-head onto the arm 29, there is secured to the inner end portion of the said arm a rubber cushion or pad 29'.

The plate 28' has hinged thereto a lever 30, the depending tail portion 30' of which is engaged at times by a stud 31, inwardly projecting from the inner face of a disk 32, se-

cured to the outer end of the worm feed-shaft 10'. When the tail portion 30' is so positioned as to lie in the path of the stud 31 during rotation of the disk 32, the stud engages with the lower end thereof and exerting an upward strain thereon and raises the same in order to lift the plate 21 through its connection therewith. As thus lifted the arms 22 22' turn upon the sleeve 11, causing the shoulder 23' of bracket 22 by riding upon the inclined face 24 of the fixed collar 24' to gradually force the slide-plate 21 inward a slight distance sufficient to enable the tail of the lever 30 to clear the stud or pin 31.

When the slide-plate 21 is in its raised position, the pin or stud 26 is engaged by and the plate 21 upheld by the finger 25' of the cam 25 bearing upon the upper face thereof, or, in other words, the said finger 25' rests upon the said pin or stud 26 and holds the plate 21 locked against downward movement.

Inasmuch as portions of the records to be reproduced vary in length, the terminal point of the wave-lines is not the same with different records. The purpose is to restore the reproducer mechanism to its starting-point the moment the record has been played in full. To accomplish this, means must be provided to throw into operation the return mechanism as the record playing finishes. A simple device for doing this comprises a gage-block 32, adjustably secured to the plate 21. From this block projects a gage-finger 32', which finger enables the operator to so regulate the position of the gage-block as to prevent the traveler 13 moving beyond the point required. The gage-block is moved until the finger 32' is brought to the stopping or terminal point of the record, when the said gage-block is secured by the set-screw 32³ to the slide-plate.

During the operation of the machine the reproducer-head is propelled over the record by the movement of the traveler 13, which is driven inward by its pawl 17 engaging with the worm feed-shaft 10'. As the reproducer mechanism reaches the end of its travel the lever 19 bears against in the present case the gage-block 32 and gradually forces the plate 21 inward to remove the pin or stud 26 from off the cam-finger 25'. The moment the said pin or stud is disengaged from the cam-finger 25' the tension of the spring 27 draws upon the arm 22 and throws the plate 21 downward, causing the upper portion of the slotted plate 21 to act upon the lever 19 to move same therewith to release the pawl 17 from engagement with the worm feed-shaft. This movement of the lever 19 actuates its connected lever 19' to raise the reproducer-head 16 in order that its needle may clear the record 4.

With the release and lowering of the plate 21 the action of the counterbalancing-weight 33 draws the traveler 13 to its starting-point. This weight 33 is connected to the downward

extension 33' of the traveler 13 by means of the chain or cord 34. With the return movement the traveler 13 is brought against the inner face of arm 22 with sufficient force to move the plate 21 outward, so as to place the pin or stud 26 immediately above the finger 25' of the cam 25, at the same time moving the lever 30 outward in order that its tail portion 30' may be in the path of the stud 31 of the disk 32. As thus positioned the said stud 31 of the rotating disk 32 engages the tail 30' of the lever 30 and raises same to lift or raise the plate 21, which as lifted is moved slightly inward to permit of the depending tail 30' clearing the stud or pin 31 by the shoulder 23 working against the inclined face 24 of the collar 24'. During this upward movement of the plate 21 the lower portion thereof bears against the under face of the lever 19 to actuate the same so as to place the pawl 17 into engagement with the worm feed-shaft. As the arm 22 turns with the raising of the plate 21 the pin or stud 26 bears upon the cam-finger 25' in order to throw the same in order that its finger will clear the pin or stud 26. As the said stud or pin passes below the finger 25' the cam 25 swings back into place by gravity, its finger moving above the pin or stud 26 in order to hold the plate 21 locked in its raised position. It will be understood that as the plate 21 is lifted the reproducer-head 16 is lowered onto the arm 29, which holds the same so as to maintain its needle clear of the record until the inward movement of the traveler 13 removes the reproducer-head from off the said arm.

The chain or cord 34 works over a pulley 34', working in bearing of an arm or bracket 34², hinged to the bed 1. When the machine is not in use, the arm or bracket 34² is swung upward so as to be out of the way, and the weight 33 placed upon the bed 1.

The slide-plate and its coacting parts for raising and lowering the reproducer-head, returning the traveler to its starting-point, and shifting the said slide-plate are readily attached to any of the machines now in use and may be placed thereon at a nominal expense.

Having thus described the invention, what is claimed as new, and desired to be protected by Letters Patent, is—

1. The combination with the worm feed-shaft, a sleeve within which same works, means

for driving the said shaft, a traveler longitudinally movable upon the sleeve, a pawl carried by the traveler which engages with the feed-shaft, a vertically-movable plate slidable upon the sleeve, means for automatically lowering the plate when the traveler has moved its full inward distance, connection between the slide-plate and the traveler's pawl for actuating the same with the vertical movement of the slide-plate, means for returning the traveler to its starting-point with the lowering of the slide-plate, and devices actuated by the drive means for automatically lifting the slide-plate with the return of the traveler in order to cause the traveler's pawl to engage with the worm feed-shaft and holding the said plate in its raised position until released by the traveler at the completion of its inward movement.

2. In a machine of the described class, the combination with the longitudinally-movable traveler, means for driving the same, of the reproducer mechanism carried by the traveler, of a device for regulating the inward movement of the traveler, means for automatically raising the reproducer mechanism when the traveler completes its inward movement and restoring the traveler and said mechanism to its starting position, devices actuated by the driving means for automatically lowering the reproducer mechanism upon the completion of the traveler's return movement and holding the same so lowered until the said traveler completes its next inward movement, and an arm or receiving device onto which the head of the reproducer mechanism is received when lowered.

3. In a machine of the described character, the combination with the reproducer mechanism, of means for raising and lowering the said mechanism for the described purpose, and means for receiving the reproducer-head when lowered and supporting the same in line for its needle to enter onto the surface of the record with the inward movement of the reproducer mechanism.

In witness whereof I have hereunto set my hand.

ELAM GILBERT.

Witnesses:

N. A. ACKER.

D. B. RICHARDS.





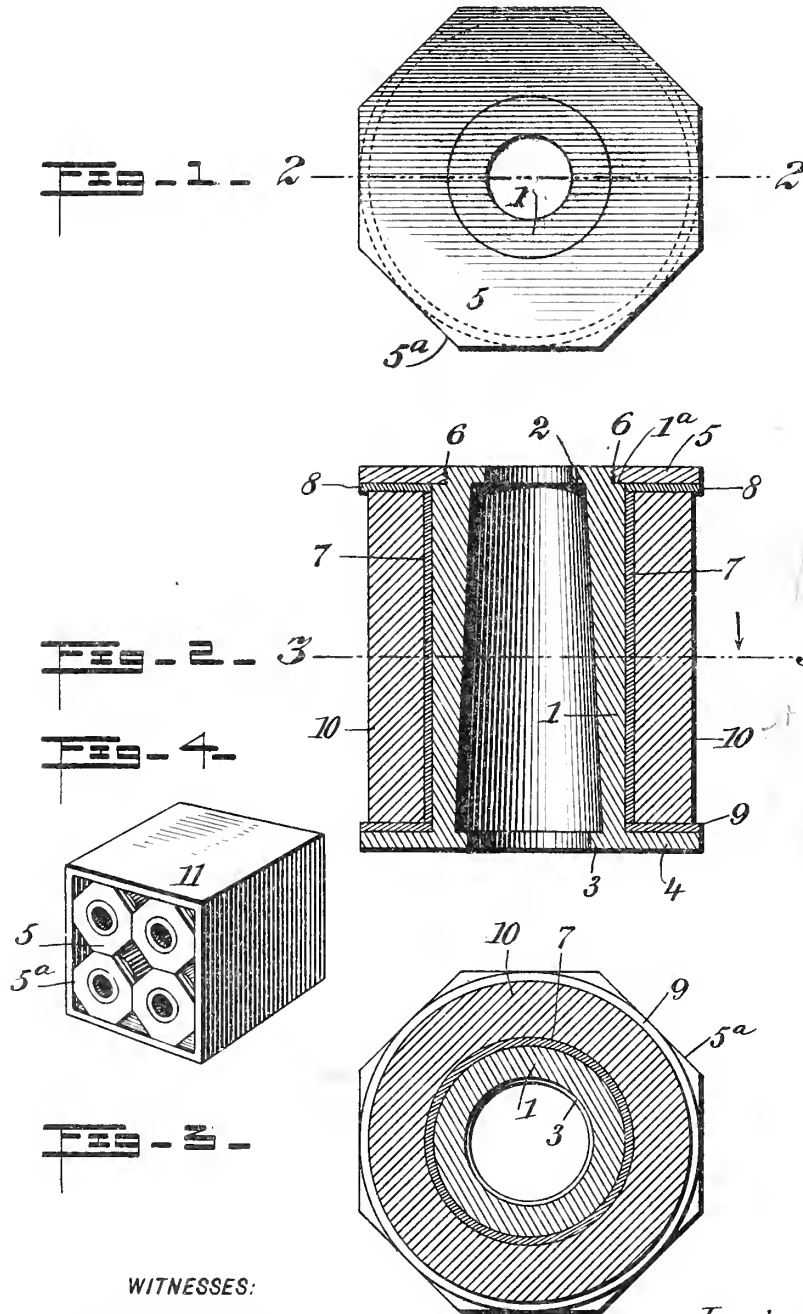
No. 766,543.

PATENTED AUG. 2, 1904.

L. STEINBERGER.
SUPPORT FOR SOUND RECORDS OR BLANKS.

APPLICATION FILED NOV. 14, 1903.

NO MODEL.



WITNESSES:

A. C. Abbott;
W. Harrison

INVENTOR
Louis Steinberger

BY *Munn*
ATTORNEYS

UNITED STATES PATENT OFFICE.

LOUIS STEINBERGER, OF NEW YORK, N. Y.

SUPPORT FOR SOUND RECORDS OR BLANKS.

SPECIFICATION forming part of Letters Patent No. 766,543, dated August 2, 1904.

Application filed November 14, 1903. Serial No. 181,191. (No model.)

To all whom it may concern:

Be it known that I, LOUIS STEINBERGER, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Support for Sound Records or Blanks, of which the following is a full, clear, and exact description.

My invention relates to supports for sound records or blanks, and admits of general use, but is intended more particularly for sound-records having cylindrical or substantially cylindrical form.

My invention embodies quite a number of improvements hereinafter described, and pointed out in the appended claims.

First among these improvements is the making of the record spool or support in composite form, so that the same may be transferred from one record to another, and thus used repeatedly; second, to prevent the spool or analogous support from rolling; third, to keep the record-cylinder out of contact with a table or other support upon which the device may chance to rest; fourth, to cushion the cylinder portion relatively to the spool portion of the record, and, fifth, to provide for packing and shipping the blanks or records. These and other advantages are attained by a structure described in the accompanying drawings.

It is a fact well known that blanks or records made of ordinary wax or wax-like material are very fragile and are frequently cracked or broken in the act of placing them upon a recording or reproducing machine. The ordinary cylindrical blanks or records are very frequently cracked or broken by merely falling from a vertical to a horizontal position. Even if not cracked the delicate surface is destroyed by the least degree of violent usage. By using my support or holder the blank or record is practically rendered so durable that it may be thrown over with considerable force and yet without injuring the delicate blank or record portion or marring the record-surface thereof.

It is broadly stated that my invention comprises a sound record or blank support or

holder made of any suitable material and constructed, preferably, as shown and claimed. 50

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the complete record or blank. Fig. 2 is a vertical central section through the same on the line 2 2 of Fig. 1. Fig. 3 is a horizontal section through the same on the line 3 3 of Fig. 2 looking toward the bottom of the drawings, and Fig. 4 is a perspective view showing a number of my spools or supports as nested for shipping. 60

The revoluble cylinder 1 is provided internally with flanges 2 3 for engaging a mandrel and has an external flange 4 at one of its ends. The other of its ends is engaged by a ring 5 having angular facets 5^a and which is screwed upon the end of the sleeve or cylinder 1 by means of a thread 6, as indicated more particularly in Fig. 2. The facets 5^a prevent the support from rolling upon the surface, on which the support may lie. A cylindrical sleeve 7 of yielding material, preferably of felt or of any felt-like substance, encircles the greater part of the cylinder 1. Disposed at either end of the sleeve 7 are washers 8 9 of yielding material. These washers are clamped against the ends of the record portion 10 of the cylinder proper by means of pressure from the clamping-ring 5 when the same is screwed into position. 75 80

In Fig. 4 is shown another purpose for the angular facets 5^a. A convenient number of spools 5 are packed in a box 11, the facets 5^a being fitted against each other and against the sides of the box, as indicated. By this means the several record-surfaces do not touch, and yet no packing material is required as between the supports and the box. Even when packed in this shape the yieldable members 7, 8, and 9 serve to protect the record portion 10 against breakage by violent shocks. It will thus be seen that one feature of my invention is quite valuable for shipping records or blanks to a distance. The expense of packing records in cotton or other inside packing material is con- 85 90 95

siderable; but this expense will be saved by packing the records as indicated in Fig. 4.

Should the record be dropped or struck a blow for any cause, the resilience of the sleeve 5 7 prevents undue shock to the fragile material of which the record portion is composed. The washers 8 9 also tend to lessen the effect of shock; but the action of these washers is slightly different from that of the cylinder-sleeve 7 for the reason that they cushion shocks in a direction at right angles to that of the cylindrical sleeve.

It will be understood, of course, that the material of which the delicate record 10 is made is quite frail and that the record-lines are very easily obliterated by contact of the record portion with ulterior objects.

By the use of the sound-record or support above described the same spool or support may be used indefinitely, and the structure of the spool or support is such as to permit the surface of the record portion to be turned off and used again without removing the record portion from the spool.

I do not limit myself to the particular form of spool or support shown, nor to facets of the kind described, nor in every instance to the use of facets. Neither do I limit myself to the exact construction of any part or parts 30 shown.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A support for sound records or blanks, comprising a spool-like member provided with facets for preventing the same from rolling, and also provided with means for supporting and retaining sound records or blanks.

2. A support for sound records or blanks, comprising a spool-like member, a cylindrical member of resilient material encircling the same, a record or blank portion of substantially cylindrical form encircling the cylindrical member of resilient material, and a pair of washers of resilient material disposed 45 against the ends of said spool-like member.

3. As an article of manufacture, a support for sound records or blanks, comprising a substantially cylindrical sleeve provided at one of its ends with a flange integral therewith and at its other end with a thickened portion and with a thread, a ring provided with a thread for engaging said thread upon said thickened portion, and a record or blank portion encircling a portion of said sleeve and disposed intermediate of said flange and said ring.

4. In a device of the character described, the combination of a record portion or blank, and a supporting member therefor, said supporting member being provided with portions extending beyond the surface of said record, and provided with facets for engaging a fixed surface and for preventing rolling motion of the device.

5. As an article of manufacture, a support

for sound records or blanks, comprising a substantially cylindrical portion provided at one of its ends with a flange rigidly connected thereto, said flange being provided with surfaces of arbitrary conformity for engaging a fixed surface and thereby preventing rolling motion of said support. 70

6. A support for sound records or blanks, comprising a member provided with a surface for engaging a sound record or blank, and also provided with facets for engaging a fixed surface, thereby preventing said sound record or blank from rolling. 75

7. A sound record or blank, comprising a substantially cylindrical member provided with a sound-recording surface and also provided with means whereby said member may be mounted, said member being further provided with surfaces of arbitrary conformity for engaging fixed surfaces, thereby preventing said member from rolling. 80 85

8. A support for sound records or blanks, comprising a longitudinal sleeve provided at one of its ends with a flange, a ring for detachably engaging its other end for the purpose of supporting and retaining sound records or blanks, and means for cushioning said sound records or blanks relatively to said flange and said ring. 90

9. In a device of the character described, the combination of a sound record or blank, a support therefor, and washers engaging the ends of said sound record or blank, and also engaging said support for the purpose of causing indirect engagement between said ends of said sound record or blank and said support. 95 100

10. As an article of manufacture, a spool-like member provided at its ends with a plurality of resilient cushioning-washers engaging the same for the purpose of clamping a record cylinder or blank upon said spool-like member and out of immediate contact with said ends. 105

11. As an article of manufacture, a support for sound records or blanks, comprising a longitudinal spool-like portion, a substantially cylindrical sound record or blank disposed adjacent thereto, and mechanism disposed intermediate of said spool-like member and said sound record or blank so as to space the ends of said sound record or blank from the ends of said spool-like portion. 110 115

12. A support for sound records or blanks, comprising a longitudinal member provided with a flange, a sound record or blank encircling said longitudinal member, resilient members engaging said sound records or blanks, one of said resilient members also engaging said flange, and detachable clamping mechanism engaging one of said resilient members and also engaging said longitudinal member for the purpose of clamping said sound record or blank. 120 125

13. A support for sound records or blanks, 130

comprising a spool-like member provided with flanges, a sound record or blank portion partially encircling said spool-like member, and means for cushioning said sound record or blank portion relatively to said flanges.

14. As an article of manufacture, a support for sound records or blanks, comprising a spool-like member provided with means for preventing the same from rolling, and also provided with means for supporting and retaining sound records or blanks thereupon.

15. In a device of the character described, the combination of a sound record or blank portion and a supporting member therefor, said supporting member being provided with a portion extending beyond the surface of said sound record or blank portion, and further provided with means for engaging a fixed surface, and thereby preventing said supporting member from rolling.

16. As an article of manufacture, a support for sound records or blanks comprising a longitudinal member provided with flanges, said flanges having surfaces of arbitrary conformity for engaging a fixed surface and thereby preventing rolling motion of said support when resting upon said surface, said support being further provided with means for engaging a sound record or blank.

17. As an article of manufacture, a support for sound records or blanks comprising a member provided with means for sustaining a sound record or blank, said member being further provided with means for preventing rolling motion of said support when resting on a fixed surface.

18. As an article of manufacture, a support for sound records or blanks comprising a spool-like member provided with means for preventing the same from rolling when resting on a fixed surface, said spool-like member being provided with means for securing a sound record or blank thereupon.

19. The combination of a sleeve-like member provided with a portion of comparatively small diameter and with a flange, a clamping member engaging said portion of comparatively small diameter, and a sound record or blank encircling said sleeve-like member, said sound record or blank being of proper length to be held firmly in position by pressure exerted upon its ends by said flange and said clamping member.

20. A support for sound records or blanks, comprising a longitudinal sleeve having a flange integral therewith, said sleeve having a portion of comparatively small diameter provided with a screw-thread, and a clamping member engaging said screw-thread for the purpose of securing sound records or blanks between said clamping member and said flange.

21. A support for sound records or blanks, comprising a longitudinal revoluble member provided with a flange, a sound record or blank

disposed adjacent to said revoluble member, and mechanism for forcing said sound record or blank toward said flange for the purpose of securing said parts firmly together.

22. In a device of the character described, the combination of a sound record or blank, a member provided with a flange adapted to support said sound record or blank, resilient members engaging said sound record or blank and said flange, and clamping mechanism for locking said sound record or blank relatively to said member provided with said flange.

23. In a device of the character described, the combination of a sound record or blank portion, and a supporting member therefor, said supporting member being provided with portions extending beyond the surface of said sound record or blank portion, and also provided with means for engaging a fixed surface, and thereby preventing rolling motion of the device.

24. In a device of the character described, the combination of a sound record or blank, a support therefor, and resilient members engaging the ends of said sound record or blank, and also engaging said supporting member.

25. In a support for sound records or blanks, the combination of a spool-like member, and a member of resilient material, said spool-like member and said member of resilient material being provided with surfaces independent of each other for supporting sound records or blanks.

26. In a device of the character described, the combination of a sound record or blank, a supporting member therefor, said supporting member being provided with flanges, and resilient members disposed intermediate of said sound record or blank, said flanges and said supporting member.

27. As an article of manufacture, a substantially cylindrical member provided with a sound-recording surface and with means whereby said member may be mounted, said member being further provided with surfaces of arbitrary conformity extending outwardly therefrom for engaging a supporting-surface and preventing said substantially cylindrical member from rolling.

28. An article of manufacture, a substantially cylindrical member provided with a surface for recording sound-waves, and also with means whereby said member may be mounted, said member being further provided with surfaces of arbitrary conformity for engaging a supporting-surface and thereby preventing said member from rolling.

29. As an article of manufacture, a longitudinal member of substantially cylindrical form provided with a recording-surface and with means for preventing said member from rolling when resting upon a supporting-surface.

30. As an article of manufacture, a substan-

tially cylindrical member provided with a recording-surface and with facets for engaging a supporting-surface, thereby preventing said substantially cylindrical member from rolling.

5 31. As an article of manufacture, a substantially cylindrical member provided with a surface for recording sound-waves, and also with means whereby said member may be mounted, said member being further provided with
10 means for preventing said substantially cylin-

dricial member from rolling when resting in a longitudinal position on a supporting-surface.

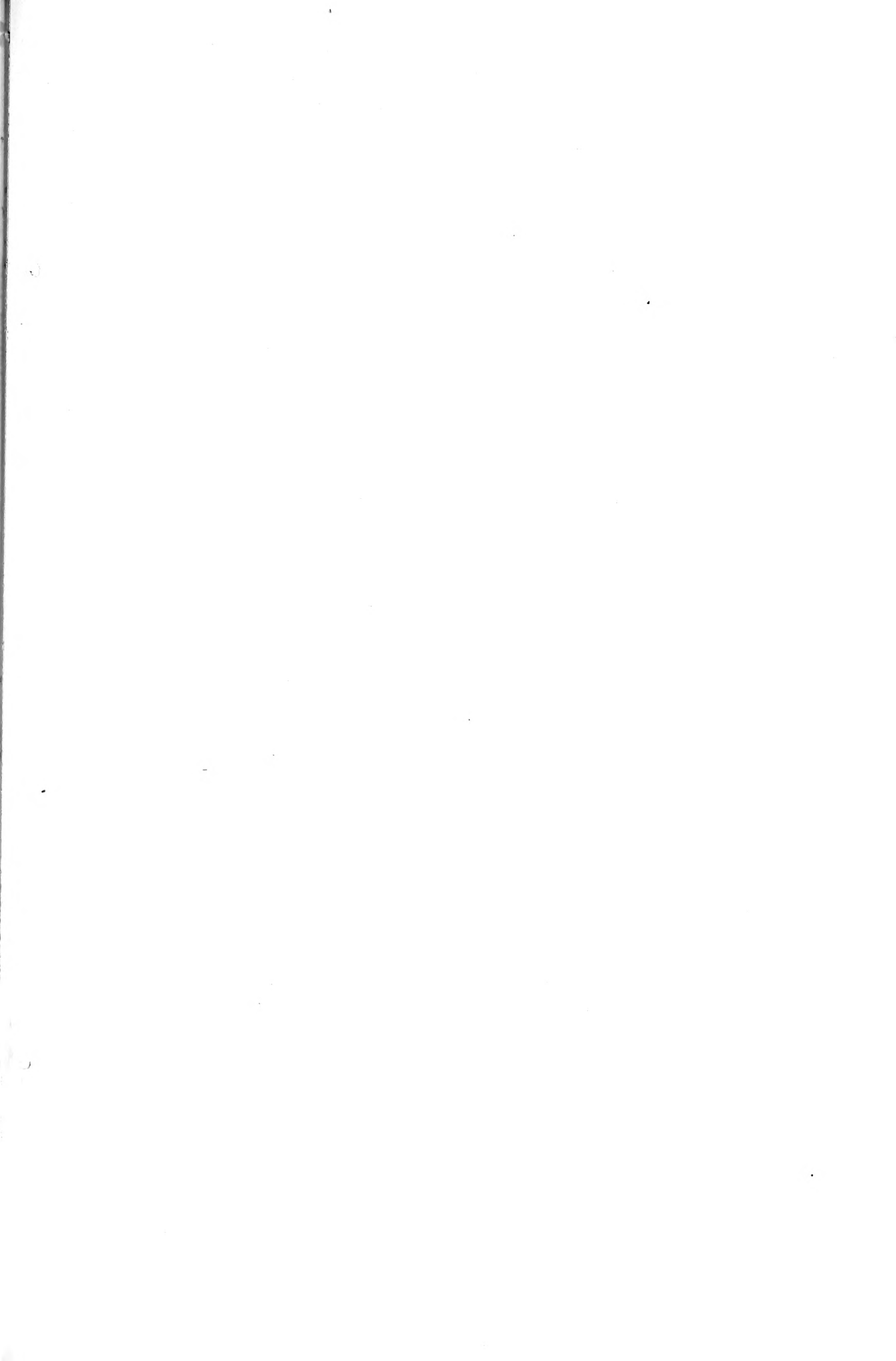
In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS STEINBERGER.

Witnesses:

WALTON HARRISON,

EVERARD BOLTON MARSHALL.



No. 766,561.

PATENTED AUG. 2, 1904.

J. WELLNER.
SOUND REPRODUCING APPARATUS.

APPLICATION FILED AUG. 14, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

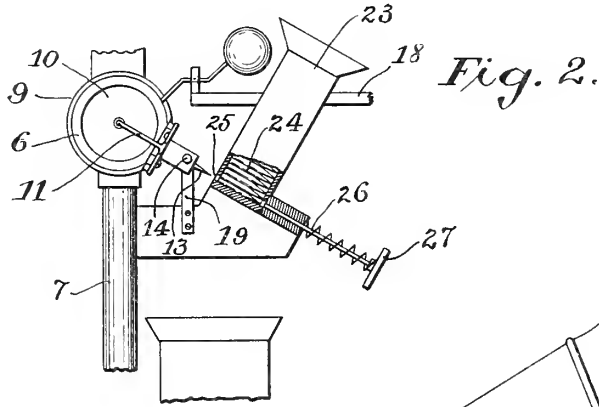
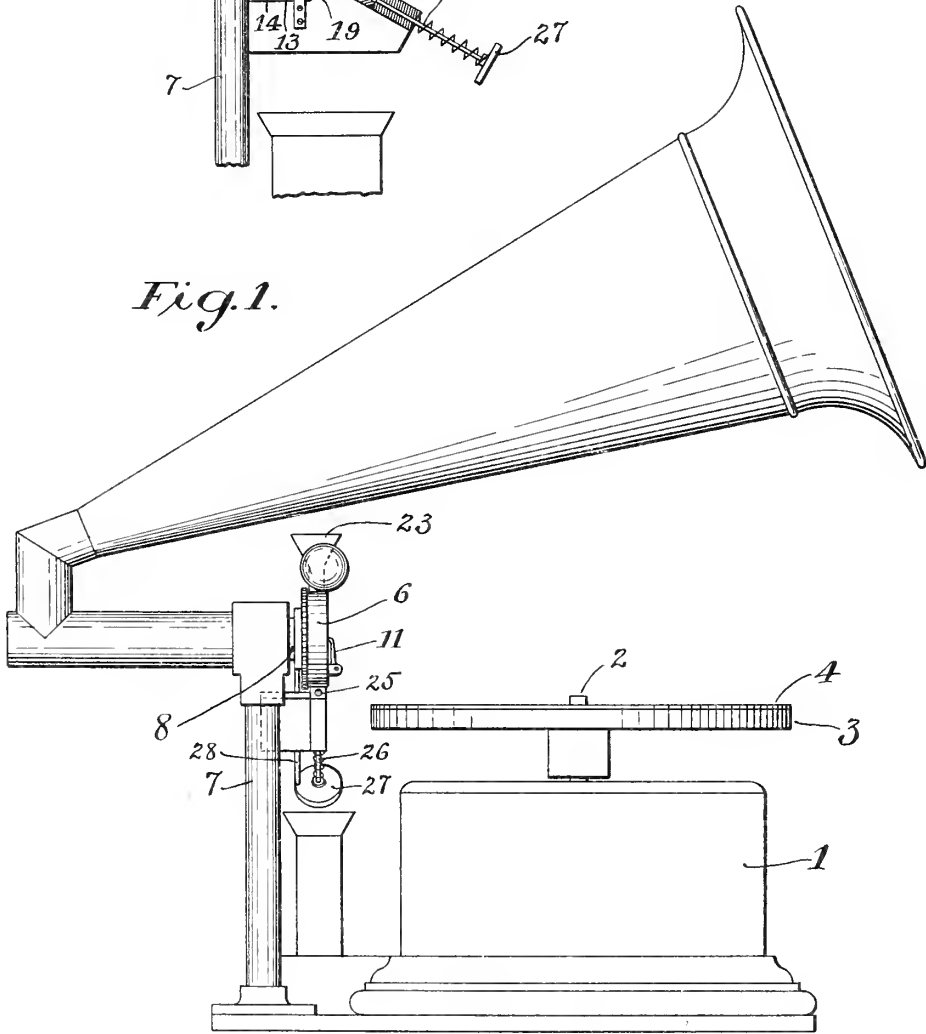


Fig. 1.



WITNESSES:

W. H. Leuby
H. E. Gamble

INVENTOR

Julius Wellner



No. 766,561.

PATENTED AUG. 2, 1904.

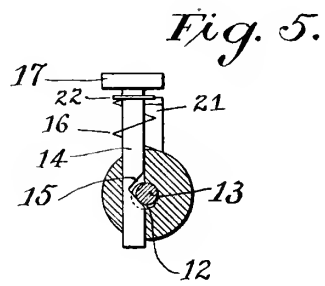
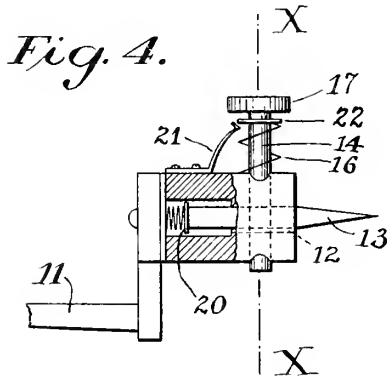
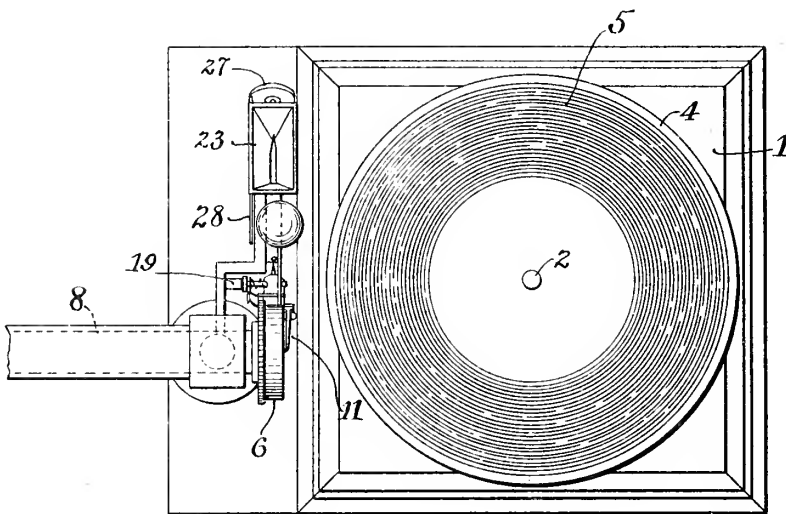
J. WELLNER.
SOUND REPRODUCING APPARATUS.

APPLICATION FILED AUG. 14, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 3.



WITNESSES:

H. W. Leuby
W. J. Gamble

INVENTOR
Julius Wellner

UNITED STATES PATENT OFFICE.

JULIUS WELLNER, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 766,561, dated August 2, 1904.

Application filed August 14, 1903. Serial No. 169,425. (No model.)

To all whom it may concern:

Be it known that I, JULIUS WELLNER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

10 Figure 1 is a side elevation of a sound-reproducing apparatus equipped with my invention. Fig. 2 is a front elevation, partially in section, of the portion of the apparatus equipped with the invention. Fig. 3 is a plan view. Fig. 4 is an enlarged detail of the outer end of the stylus-lever, showing the clutch for retaining the stylus therein. Fig. 5 is a section on line *x-x*, Fig. 4.

This invention relates to improvements in 20 sound-reproducing machines.

The invention consists in providing a novel and efficient means whereby the stylus may be automatically ejected from its position in the apparatus when the sound-box is returned 25 to the starting position after having reproduced a record.

The invention also consists in providing means whereby a new stylus may be inserted into the apparatus to take the place of the 30 ejected stylus after the sound-box has been returned to the starting position.

The invention further consists of certain details of construction hereinafter described.

In the drawings I have illustrated a well-known type of sound-reproducing machine to 35 which my invention may be applied similar to that shown in United States Letters Patent No. 734,206, issued to me July 21, 1903, but have omitted many parts that are well known and not necessary to an understanding 40 of my present invention.

In said drawings, 1 is the frame of the apparatus, in which is journaled the usual record-carrying shaft 2, adapted to be rotated from a suitable source of power in any well-known manner. On said shaft is mounted the turn-table 3, carrying the record-disk 4, provided with the usual helical groove 5, being the composition to be reproduced. The

50 sound-box 6 is mounted in a support or stand-ard 7 in such manner that it will be radially movable into and out of operative position with reference to the record-disk and also rotatable on its own axis similarly to the sound-box illustrated in said patent or in any other 55 well-known manner. The sound-box, as usual, comprises a tube 8, having secured to its outer end the frame 9, carrying the diaphragm 10 and the stylus-lever 11, pivoted to said frame and connected at its inner end to the dia- 60 phragm.

The outer end of the stylus-lever is provided with a hole or recess 12, into which is adapted to be inserted and retained a stylus 13. Said hole 12 is made of somewhat larger 65 diameter than the stylus, as seen in Fig. 5, for a purpose hereinafter appearing. Carried by the stylus-lever is a rod 14, which passes through a transverse hole in the stylus-lever and intersects the hole 12, into which 70 the stylus is inserted. Said rod 14 is provided with a triangular notch 15, Fig. 5, one edge of which is adapted to engage the periphery of the stylus in the hole 12 and by the stress of a spring 16 on said rod to press the 75 stylus against the opposite side of the said hole, and so to frictionally hold the stylus in place.

The outer or free end of the rod 14 is provided with a head 17, between which and the 80 side of the stylus-lever said spring 16 is adapted to bear.

After the stylus has traversed the rotary groove of the record-disk it is disengaged from the record-disk and the sound-box is 85 moved radially outward to the inoperative position. This may be done either manually or by suitable mechanism—such, for example, as that shown in my previous patent hereinbefore referred to. As the sound-box reaches 90 the limit of its outward movement the head 17 of rod 14 impinges against a suitable stop 19, and thereby said rod is pushed slightly inwardly, causing the notch 15 thereof to register with the hole 12, and so to free the stylus, 95 which is thereupon free to drop from the hole or may be ejected by a spring-controlled plate or disk 20 within the upper part of the hole 12.

In order that the said notch 15 shall continue to register with said hole until a new stylus has been inserted therein, I usually provide a means for retaining the rod 14 in such position. In this instance the following device is employed: Secured to and projecting from the side of the stylus-lever is a spring-dog 21, whose free end is adapted (when pressed inwardly to the position where its notch registers with said hole 12) to engage a depression or groove 22 in said rod, thus locking the latter in such position until said spring-dog is released from engagement with said groove.

The spring 16 on rod 14 would usually be of such resistance that when the sound-box is retracted to the starting position after having completed a record the head 17, coming against the stop 19, would cause the rod to be pushed forward with a slight bump, causing the groove to be brought into registry with said spring-dog, which of course immediately engages the same and locks it in that position; but when said spring-dog is released from the groove and the parts seek equilibrium the said spring will press the rod backwardly to cause the side of the notch to bind and hold the stylus in the hole.

The stop 19 is made yielding in order to permit the ejection of the stylus 13 just before the sound-box 6 reaches the limit of its outward movement.

As a convenient means for inserting a new stylus into the hole 12 after the ejection of the old one I provide the following construction: Mounted on the frame of the apparatus is a hopper or magazine 23, adapted to contain a number of styluses 24, as seen in Fig. 2. The latter lie therein in such position that the lower one thereof is in axial alinement with an exit-opening 25 of the magazine and also with the hole 12 when the stylus-lever occupies its outermost position. In line with and in front of the lowermost stylus in said magazine is a spring-controlled plunger 26, having a suitable handle or head 27. By pressing the plunger inwardly by hand a stylus is caused to be projected into the hole 12 against the stress of the spring-controlled plate 20 to its position in said hole, and at the same time the spring-dog 21 is released from engagement with the groove, thus causing the rod 14 to be retracted by its spring and engage said stylus, as above described. As a ready means for effecting this release of the said spring-dog I provide the plunger 26 with an arm 28, that is adapted (at or after the moment the stylus has reached its position in hole 12) to engage the under side of said spring-dog and elevate its engaging end from said groove.

I do not wish to be understood as limiting myself to the precise means for releasably securing the stylus in the stylus-lever, as other automatically-released clutches may be used without departing from the essence of the in-

vention, nor do I wish to be understood as being limited to any particular means for inserting the stylus into its position.

I claim—

1. In a sound-reproducing apparatus, the combination with the rotary grooved record, the stylus, and stylus-support movable into and out of operative position, of means for automatically discharging the stylus from its support when said support is moved to the inoperative position, substantially as and for the purpose set forth.

2. In a sound-reproducing apparatus, the combination with the rotary grooved record, the stylus, and stylus-support movable into and out of operative position, of a clutch device carried by said support and adapted to engage and retain said stylus, and means for automatically operating said clutch device to release the stylus when said support is moved to the inoperative position, substantially as and for the purpose set forth.

3. In a sound-reproducing apparatus, the combination with the rotary grooved record, the stylus, and stylus-support movable into and out of operative position, of a clutch device carried by said support and adapted to engage and retain said stylus, means for automatically operating said clutch device to release the stylus when said support is moved to the inoperative position, and means for discharging the stylus from said support when released by said clutch device, substantially as and for the purpose set forth.

4. In a sound-reproducing apparatus, the combination of a rotary grooved record, the sound-box provided with the diaphragm, stylus-lever and stylus, the latter adapted to engage and traverse the groove in said record, said sound-box being adapted to be returned to a predetermined non-engaging position, a clutch device at the free end of said stylus-lever adapted to receive and temporarily retain said stylus, together with means for automatically releasing said clutch device and thereby permitting the discharge of the stylus, when said sound-box is retracted to said non-engaging position, substantially as and for the purpose set forth.

5. In a sound-reproducing apparatus, the combination of a rotary grooved record, a sound-box provided with a diaphragm, stylus-lever and stylus, the latter adapted to engage and traverse the groove in said record, said sound-box being adapted to be returned to a predetermined non-engaging position, the outer end of the said stylus-lever being provided with a hole to receive said stylus, a clutch device comprising a spring-controlled rod intersecting said hole and provided with the notch adapted to engage said stylus and press the same against the wall of said hole, together with means for automatically causing said rod to release the stylus when the

sound-box is retracted to said non-engaging position, substantially as and for the purpose set forth.

6. In a sound-reproducing apparatus, the combination of a rotary grooved record, a sound-box provided with a diaphragm, stylus-lever and stylus, the latter adapted to engage and traverse the groove in said record, said sound-box being adapted to be returned to a predetermined non-engaging position, a clutch device on said stylus-lever adapted to receive and temporarily retain said stylus, means for automatically releasing said clutch device and permitting the discharge of the stylus when said sound-box is retracted to said non-engaging position, together with means for inserting a stylus into said grasp of the clutch device when said device is released, substantially as and for the purpose set forth.

7. In a sound-reproducing apparatus, the combination of a rotary grooved record, a sound-box provided with a diaphragm, stylus-lever and stylus, the latter adapted to engage and traverse the groove in said record, said sound-box being adapted to be returned to a predetermined non-engaging position, a clutch device on said stylus-lever adapted to receive and temporarily retain said stylus, means for automatically releasing said clutch device and permitting the discharge of the stylus when said sound-box is retracted to the said non-engaging position, together with the magazine having the exit-opening in alinement with said clutch device, and the push-rod for projecting a stylus from said magazine into position to be gripped by said clutch device, substantially as and for the purpose set forth.

8. In a sound-reproducing apparatus, the combination of a rotary grooved record, a sound-box provided with a diaphragm, stylus-lever and stylus, the latter adapted to engage and traverse the groove in said record, said sound-box being adapted to be returned to a predetermined non-engaging position, a clutch device on said stylus-lever adapted to receive and temporarily retain said stylus, means for automatically releasing said clutch device and permitting the discharge of the stylus when said sound-box is retracted to said non-engaging position, and means to automatically lock said clutch in said released position, substantially as and for the purpose set forth.

9. In a sound-reproducing apparatus, the combination of a rotary grooved record, a sound-box provided with a diaphragm, stylus-lever and stylus, the latter adapted to engage and traverse the groove in said record, said sound-box being adapted to be returned to a predetermined non-engaging position, a clutch device on said stylus-lever adapted to receive and temporarily retain said stylus, means for automatically releasing said clutch device and permitting the discharge of the stylus when said sound-box is retracted to said non-engag-

ing position, and means to automatically lock said clutch in said released position, together with means adapted to be operated to insert a stylus into said clutch device while the same is in the released position, and means for unlocking said clutch device, substantially as and for the purpose set forth.

10. In a sound-reproducing apparatus, the combination of a rotary grooved record, a sound-box provided with a diaphragm, stylus and stylus-lever, the former adapted to engage and traverse the groove in said record, said sound-box being adapted to be returned to a predetermined non-engaging position, the outer end of the stylus-lever being provided with a hole to receive said stylus and of slightly-larger diameter than the latter, the spring-controlled rod carried by said stylus-lever and intersecting said hole and provided with the notch adapted to engage said stylus and press the same against the wall of said hole, means for automatically engaging said rod and causing the same to be retracted to release the stylus when the sound-box is in the non-engaging position, and means for locking said rod in said releasing position, substantially as and for the purpose set forth.

11. In a sound-reproducing apparatus, the combination of a rotary grooved record, a sound-box provided with a diaphragm, stylus-lever and stylus, the latter adapted to engage and traverse the groove in said record, said sound-box being adapted to be returned to a predetermined non-engaging position, the outer end of the stylus-lever being provided with a hole to receive said stylus and of slightly-larger diameter than the latter, the spring-controlled rod carried by said stylus-lever and intersecting said hole and provided with a notch adapted to engage said stylus and press the same against the wall of said hole, means for automatically engaging said rod and causing the same to be retracted to release the stylus when the sound-box is in the non-engaging position, and means for locking said rod in said releasing position, together with means adapted to be operated to insert a stylus into said clutch device while said rod is retracted and means for unlocking said rod, substantially as and for the purpose set forth.

12. In a sound-reproducing apparatus, the combination with the rotary grooved record, the stylus, and the stylus-support movable into and out of operative position, of a stationary support, a stylus-magazine thereon and arranged adjacent to the stylus-support when the latter is out of operative position, and means adapted to be operated to move a stylus from the magazine and into the stylus-support, substantially as and for the purpose set forth.

13. In a sound-reproducing apparatus, the combination with the rotary grooved record, the stylus, and the stylus-support movable into and out of operative position, of a stationary

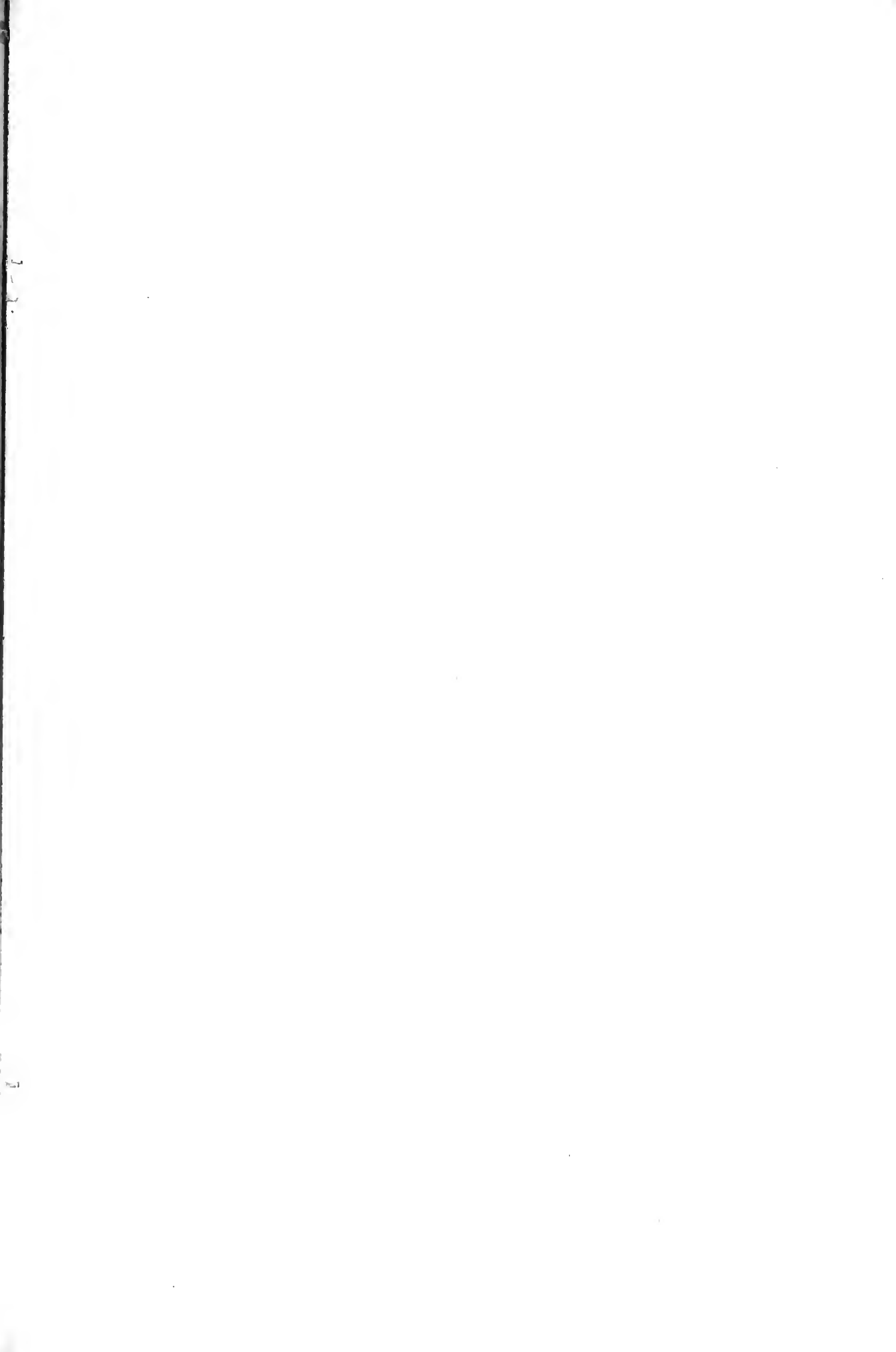
support, a stylus-magazine thereon and ar-
ranged adjacent to the stylus-support when
the latter is out of operative position, and a
reciprocative plunger adapted to be operated
5 to move a stylus from the magazine and into
the stylus-support, substantially as and for
the purpose set forth.

In testimony whereof I have hereunto af-
fixed my signature this 13th day of August,
A. D. 1903.

JULIUS WELLNER.

Witnesses:

WALTER C. PUSEY,
W. W. CANBY.



No. 767,216.

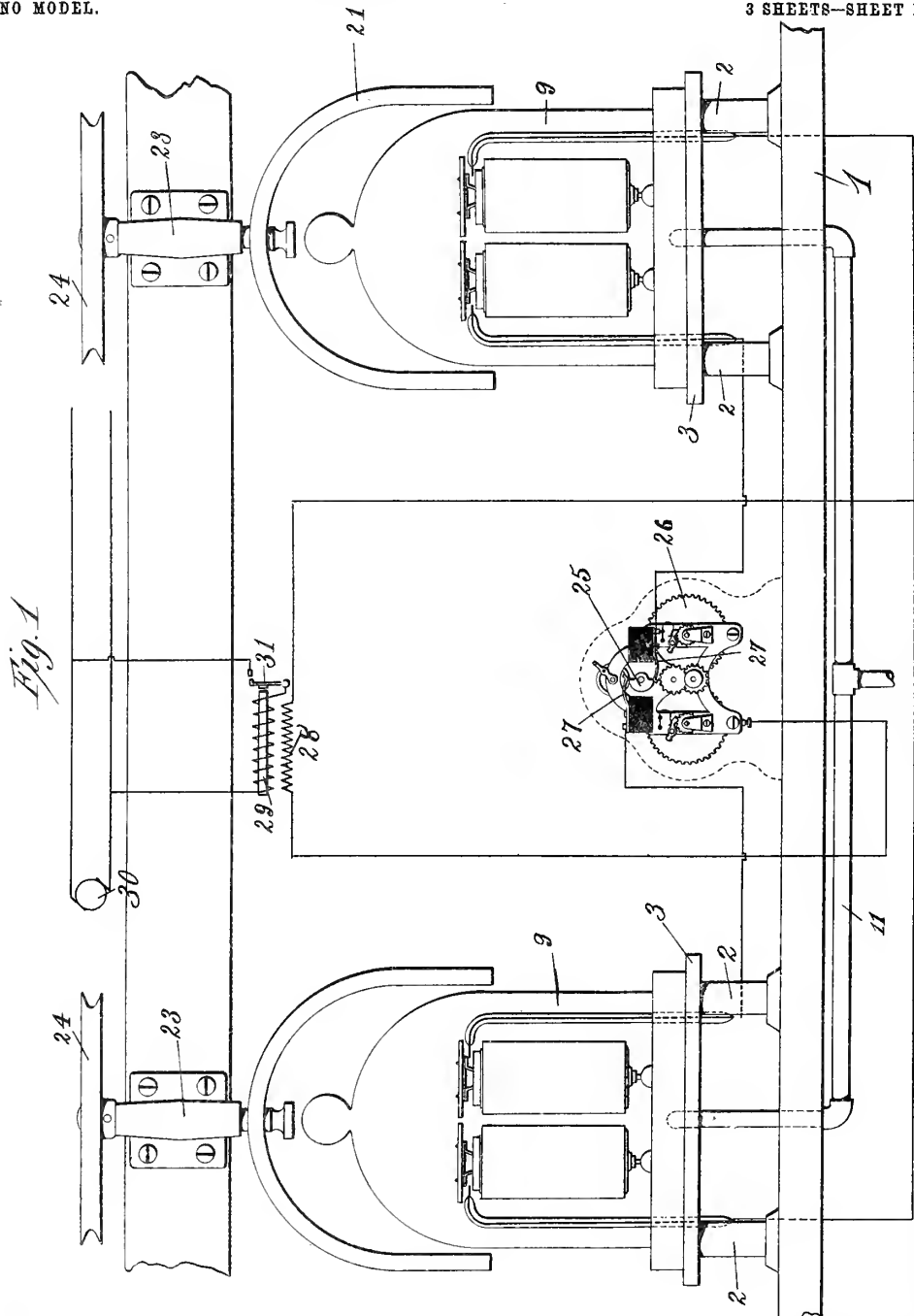
PATENTED AUG. 9, 1904.

T. A. EDISON.
APPARATUS FOR VACUOUSLY DEPOSITING METALS.

APPLICATION FILED AUG. 1, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

Ludwig F. Ott
William A. Delane

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Thomas A. Edison
by Frank L. Sizer
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No. 767,216.

PATENTED AUG. 9, 1904.

T. A. EDISON.
APPARATUS FOR VACUOUSLY DEPOSITING METALS.

APPLICATION FILED AUG. 1, 1903.

NO MODEL.

3 SHEETS—SHEET 2.

Fig. 2

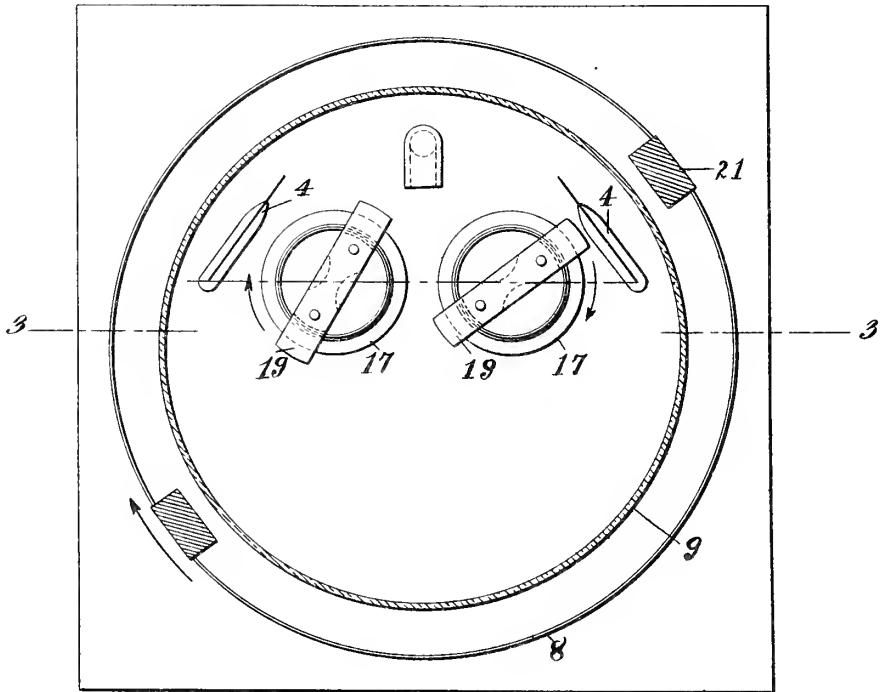
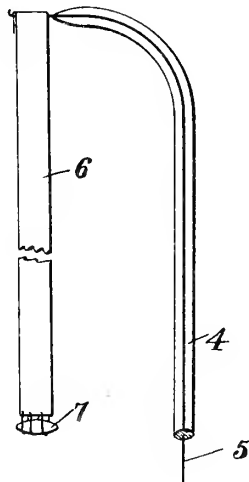


Fig. 4



Witnesses:

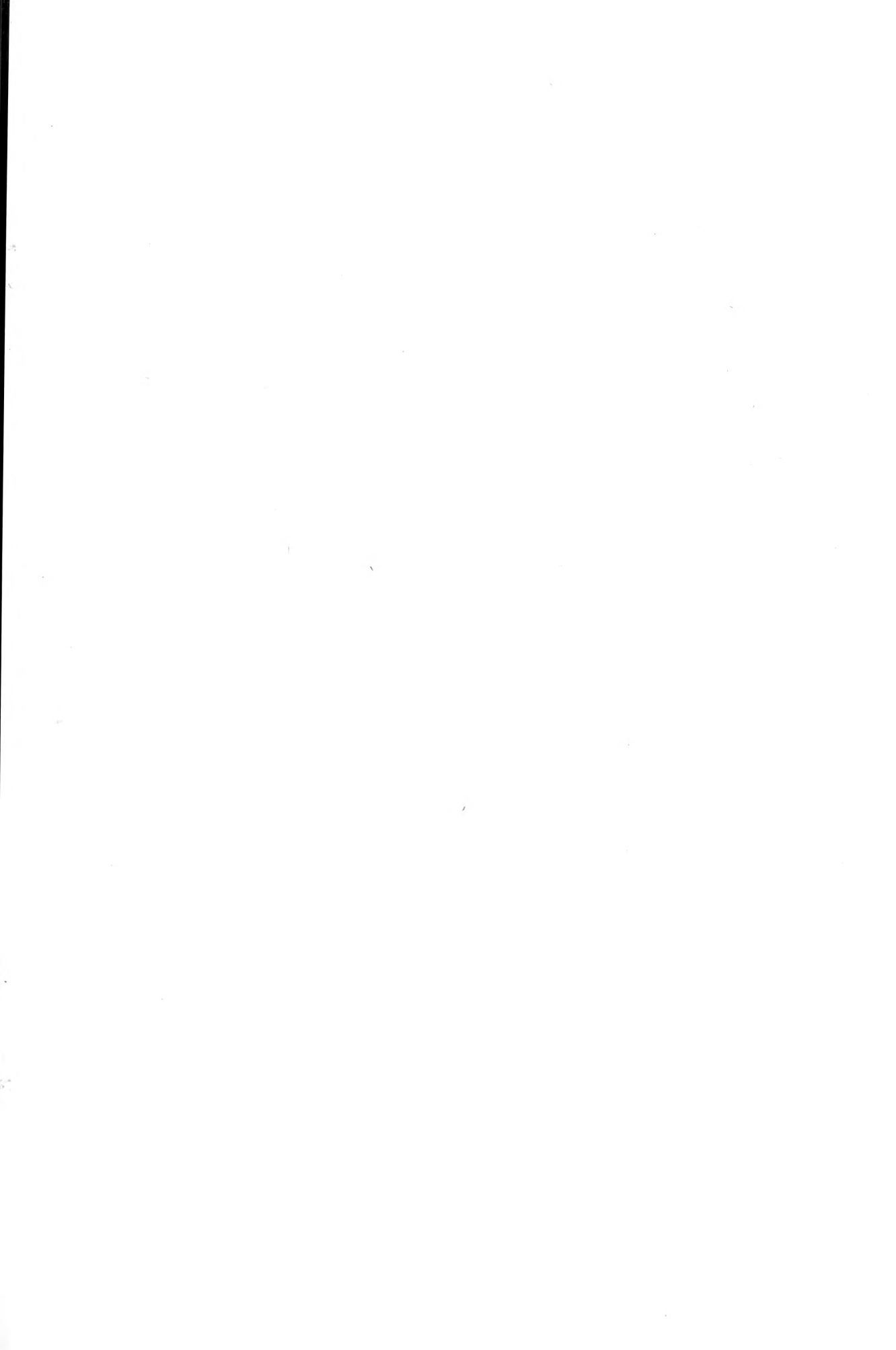
Ludwig F. Alt

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No. 767,216.

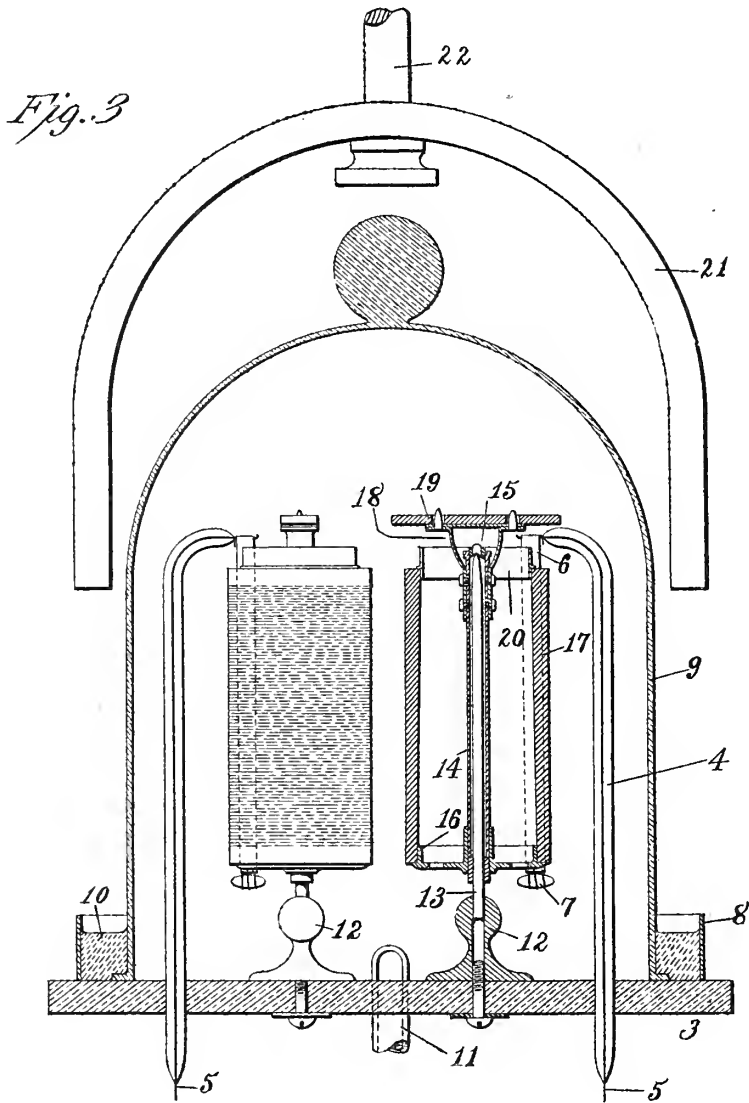
PATENTED AUG. 9, 1904.

T. A. EDISON.
APPARATUS FOR VACUOUSLY DEPOSITING METALS.

APPLICATION FILED AUG. 1, 1903.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses:

Ludwig F. Cott

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A COR-
PORATION OF NEW JERSEY.

APPARATUS FOR VACUOUSLY DEPOSITING METALS.

SPECIFICATION forming part of Letters Patent No. 767,216, dated August 9, 1904.

Application filed August 1, 1903. Serial No. 167,930. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Llewellyn Park, Orange, in the county of Essex, State of New Jersey, have invented certain Improvements in Apparatus for Vacu-
5 ously Depositing Metals, of which the follow-
ing is a description.

My invention relates to an improved appa-
ratus for more expeditiously carrying into ef-
fect the process for depositing metals *in vacuo*
10 of the general character covered by my Pat-
ents No. 526,147, of September 18, 1894, and
No. 713,863, of November 18, 1902.

The apparatus has been designed particu-
larly for depositing on phonograph-records a
15 minutely thin film of vaporized metal which
shall act as a foundation for the heavier elec-
troplated deposit in order that a matrix or
mold of such a record may be secured.

With my improved apparatus I utilize a plu-
rality of phonograph-records or other objects
to be coated in the same vacuum-chamber and
simultaneously deposit the metal on such ob-
jects by maintaining a high-tension discharge
25 between electrodes formed of the metal to be
deposited. This materially facilitates the
process, since considerable time is occupied in
mounting and sealing the vacuum-chamber
and in exhausting the same.

I find in the practical operation of my pro-
cess that if the electrical discharge is maintain-
ed continuously between the metallic elec-
trodes, and particularly if the latter are very
thin, as is preferable, the electrodes become
35 objectionably heated and may in time actually
melt, so as to destroy their utility. This ob-
jection could of course be overcome by pe-
riodically interrupting the current, so as to
permit the electrodes to cool; but, as it is
40 preferable that the induction-coil and other
electrical apparatus, as well as the mechanical
and magnetic appliances, should operate con-
tinuously, I secure the desired result by em-
ploying a pair of exhausted chambers in which
45 the depositing takes place alternately, so that
during the time that metal is being deposited
on the object or objects in one chamber the

electrodes of the other chamber are permitted
to cool.

The present invention not only relates to the
50 details of construction and arrangement al-
ready indicated, but it relates also to further
constructional details, all as will be more fully
hereinafter described and claimed.

In order that the invention may be better
55 understood, attention is directed to the accom-
panying drawings, forming a part of this speci-
fication, in which—

Figure 1 is a front view of the apparatus for
use in coating four phonograph-records and
60 showing the circuits diagrammatically; Fig.
2, a cross-sectional view through one of the
vacuum-chambers; Fig. 3, a vertical sectional
view on the line 3 3 of Fig. 2, and Fig. 4 a
separate detailed view of one of the electrodes
65 and its support.

In all of the above views corresponding parts
are represented by the same numerals of ref-
erence.

The base 1 is provided with supports 2, on
70 which are mounted the base-plates 3, made,
preferably, of glass. Extending up through
the base-plates 3 are glass tubes 4, carrying
circuit-wires 5 5. Depending from the ends
of these conductors are electrodes 6, made of
75 the metal which is to be deposited and pre-
ferably in the form of thin strips of foil. For
the coating of phonograph-records I prefer-
ably use gold, owing to the fact that it may be
highly comminuted and also because of its non-
80 oxidizable character. I find that the best re-
sults are secured and the most even coating
obtained when the electrodes are perfectly
flat, and I therefore preferably attach a small
weight 7 to the bottom of each to effect this
85 result.

Mounted on the plate 3 is a metal rim 8,
within which is placed a glass bell or jar 9,
having a flanged lower end resting on said
plate. A layer of paraffin 10 or similar wax-
90 like sealing material in molten condition is
now flowed into the space within the rim 8,
so as to make a perfectly-tight joint. Air
from within the glass jar or bell 9 is exhausted

therefrom through a pipe 11, connected with a vacuum-pump of any suitable and approved type. Within the vacuum-chamber are one or more supports 12, which carry vertical shafts 13, having tapered upper ends. Surrounding each of these shafts is a sleeve 14, provided with a hardened bearing-cup 15 at its top, which engages the shaft 13. The lower end of the sleeve 14 carries a disk 16, which receives the record or other object 17. Extending up from the sleeve 14 are arms 18, which receive a removable armature 19.

The phonograph-record or other object preferably carries at its top a guard or shield 20, which fits within the top of the record 17 and is supported thereby. This guard may be of any material, brass being preferably used by me. The guard receives the metal which would ordinarily be deposited within the interior of the record 17, and when made of brass it appears to deflect the electrical discharge in a downward direction against or toward the outer surface of the record. The guard thus prevents the metal from depositing on the inside of the object and causes the metal to deposit evenly on its edge with a clear line of demarcation, so as to permit a uniform electroplating, as will be understood.

Mounted outside of each of the vacuum-chambers is a magnet 21, removably carried at the lower end of the shaft 22, mounted in the bearing 23 and rotated by a belt-wheel 24, to which power is applied. In order to operate the vacuum-chambers alternately to permit the electrodes within one to cool while the depositing is taking place in the other, I make use of a switch 25, preferably driven by a clockwork mechanism 26 and making contact alternately with contact-springs 27. These springs are connected each with one of the electrodes of the two chambers, as shown. The other electrodes (one in each chamber) are connected to one side of the secondary circuit 28 of an ordinary induction-coil. The other side of this secondary circuit connects with the switch 25 through the clockwork mechanism, as shown. The primary circuit 29 of the induction-coil is connected in multiple with the source of supply 30 and includes a circuit-breaker 31, as is common in this art. In operation a proper vacuum is created in the two chambers, and by means of the switch 25 the induction-coil will be connected alternately, first with the electrodes of one chamber and then with the electrodes of the other chamber. The discharge is so regulated as to secure between the electrodes a silent or brush discharge, as I describe in my patent last referred to. This discharge causes the metal composing the electrodes to be vaporized and deposited on the objects. The magnets 21 are simultaneously rotated, so as to rotate the objects, whereby a perfectly-uniform film will be deposited thereon. When this film is of the desired thickness, the bells

or jars 9 are removed, thereby permitting the coated objects to be removed for subsequent treatment, whereupon the operations described are repeated.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In vacuum deposit apparatus, the combination with an exhausted chamber with metallic electrodes therein and means for effecting an electrical discharge between said electrodes, of supports within the chamber and between the electrodes for sustaining a plurality of objects to be coated, and means for simultaneously rotating said objects, substantially as set forth.

2. In vacuum deposit apparatus, a weighted metallic foil-like electrode, substantially as and for the purposes set forth.

3. In vacuum deposit apparatus, an electrode-foil supported at its upper end and a weight carried by said foil at its lower end, substantially as set forth.

4. In vacuum deposit apparatus, a shield or guard carried by the upper edge of the object to be coated, substantially as and for the purposes set forth.

5. In vacuum deposit apparatus, the combination with an exhausted chamber and electrodes therein, of a vertical shaft within said chamber, a sleeve rotatably mounted on said shaft, and a disk carried by said sleeve for supporting the object to be coated, substantially as set forth.

6. In vacuum deposit apparatus, the combination with an exhausted chamber and electrodes therein, of a vertical shaft within said chamber, a sleeve rotatably mounted on said shaft, a disk carried by said sleeve for supporting the object to be coated, a removable armature carried by said sleeve, and a magnet mounted externally of the chamber for attracting and rotating said armature, substantially as set forth.

7. In vacuum deposit apparatus, the combination with a pair of exhausted chambers, electrodes therein and supports for objects to be coated in said chambers, of a source of high-tension current, and means for alternately connecting said source with the electrodes of the respective chambers, substantially as and for the purposes set forth.

8. In vacuum deposit apparatus, the combination with a pair of exhausted chambers, electrodes therein and supports for objects to be coated in said chambers, of a source of high-tension current, and means for automatically and alternately connecting said source with the electrodes of the respective chambers, substantially as and for the purposes set forth.

9. In vacuum deposit apparatus, in combination, a plurality of supports for objects to be coated and of pairs of electrodes supported *in vacuo*, a source of high-tension current and

means for automatically and alternately connecting said source with each pair of electrodes, substantially as set forth.

5 10. In vacuum deposit apparatus, in combination, a plurality of supports for objects to be coated, a plurality of electrodes supported *in vacuo*, a source of high-tension current and means for automatically and regularly

connecting said source with said electrodes in pairs.

This specification signed and witnessed this 30th day of July, 1903.

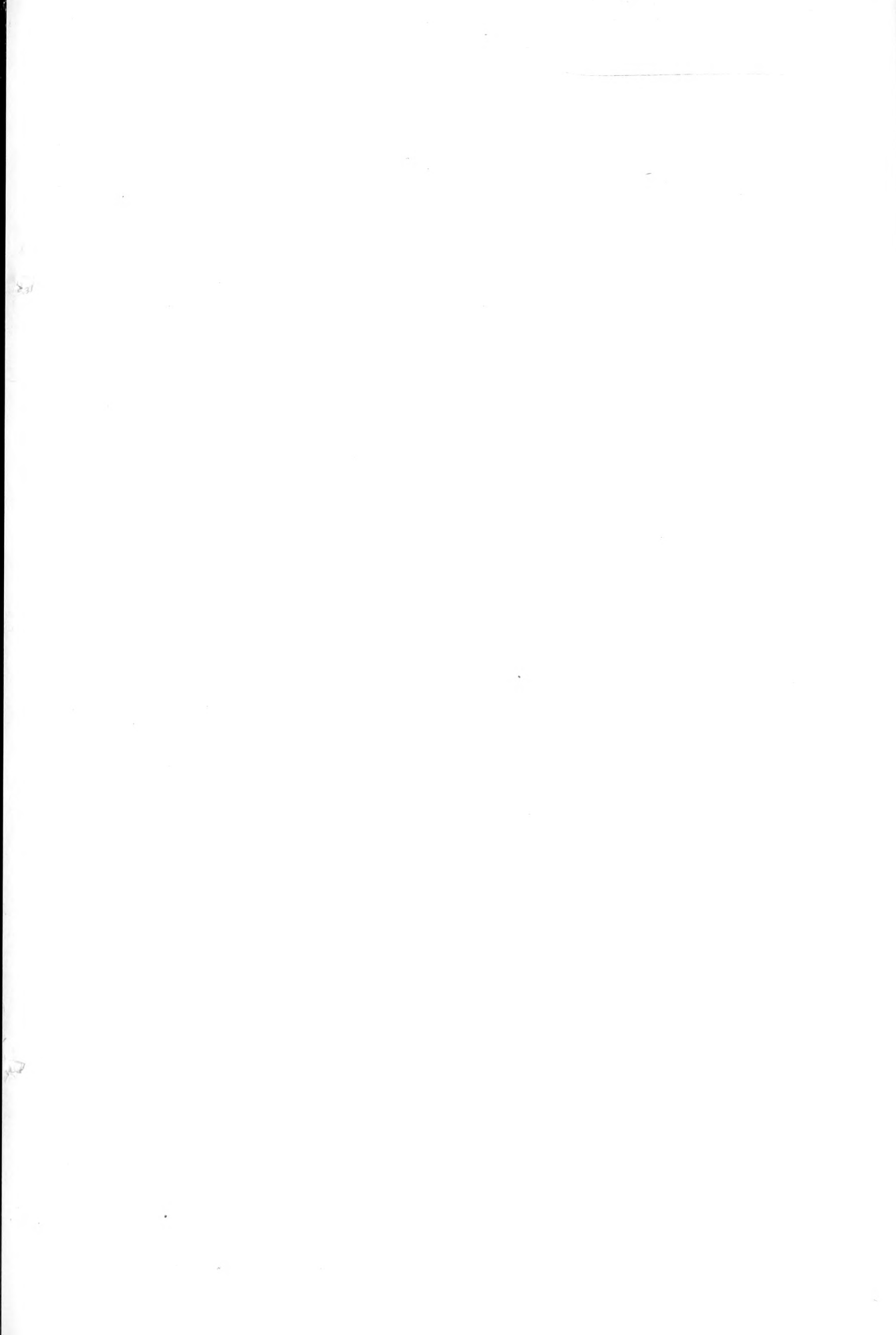
THOS. A. EDISON.

Witnesses:

FRANK L. DYER,

WILLIAM A. DOLAN.





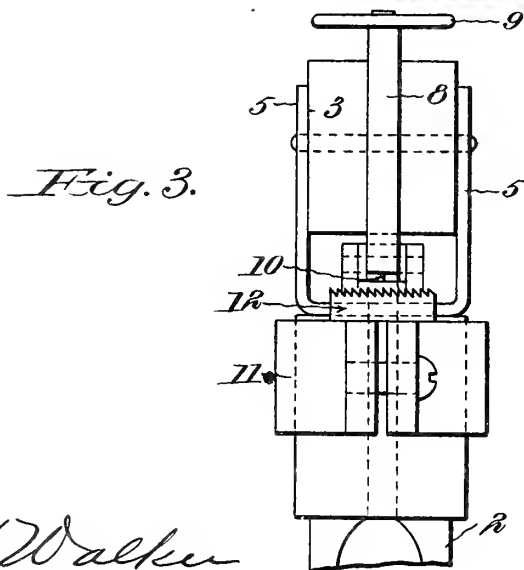
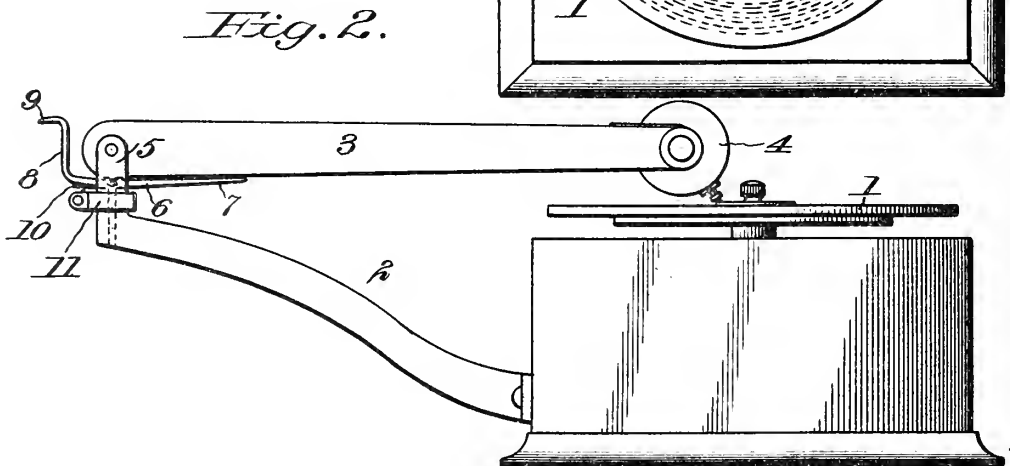
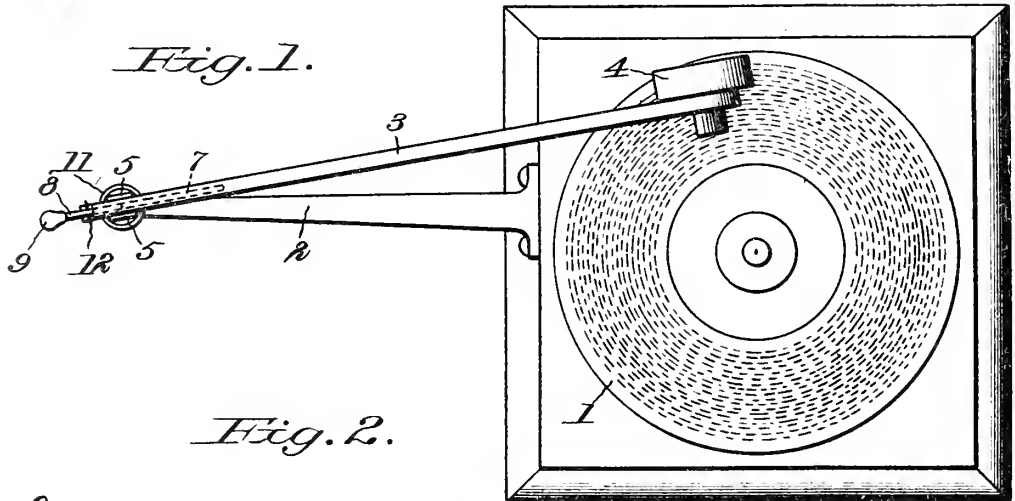
No. 767,342.

PATENTED AUG. 9, 1904.

H. P. HUSE.
REPEATING MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED JUNE 1, 1903.

NO MODEL.



Witnesses

W. Walker
Ada C. Briggs

Inventor

Harry O. Huse
W. M. Huse

Attorney

UNITED STATES PATENT OFFICE.

HARRY P. HUSE, OF THE UNITED STATES NAVY, ASSIGNOR TO UNITED STATES SCHOOL OF LANGUAGES, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

REPEATING MECHANISM FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 767,342, dated August 9, 1904.

Application filed June 1, 1903. Serial No. 159,624. (No model.)

To all whom it may concern:

Be it known that I, HARRY P. HUSE, of the United States Navy, have invented a certain new and useful Improvement in Repeating Mechanisms for Phonographs, of which the following is a full, clear, and exact description.

In utilizing sound-reproducing machines—such as those commonly known as “phonographs,” “graphophones,” and “gramophones”—especially for educational purposes, it is desirable to provide for the repetition of a part or the whole of a record. Means for accomplishing this object have been applied to the Edison phonograph, and means have been devised for automatically returning the reproducer to the initial starting-point at the completion of the travel of the reproducer in disk machines.

In the present invention means are provided for arresting the reproducer of a disk machine and resetting it at any desired point in the sound-groove of the disk, so as to repeat any portion of the record any number of times.

The means last above referred to include a device coöperating with another member to raise the stylus out of the sound-record groove as the record rotates, move it laterally and arrest it at a selected point between the ends of such groove, and then return it to the groove at such selected point again to traverse the previously-traveled portion of the groove, so that any desired portion of the record less than the whole may be repeated as often as required.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a top plan view, and Fig. 2 is a side elevation, showing a disk machine somewhat conventionally and having the improvement applied. Fig. 3 is an end view, on a larger scale, of the improvement.

The disk record 1 is as usual, and so are the bracket 2, reproducer-arm 3, and reproducer 4 and its stylus.

The yoke 5, in which the reproducer-arm

is pivoted and which turns with the arm as it sweeps horizontally over the disk, has pivoted in it a lever 6, one leg, 7, of which extends beneath the arm 3 forwardly, and the other leg, 8, of which extends rearwardly and is formed with a finger-piece 9, elevated to about the level of the top of arm 3. The leg 8 is also provided with a knife-edge 10 on its lower side. On the head or socket end of the bracket 2 is a clamp 11, supporting a ratchet-tooth rack 12 in line with the knife-edge and equal to its sweep.

The lever 6 constituted as above forms a trigger and is herein so designated.

If it be desired to repeat any portion of the record during its transmission, the finger-piece 9 is depressed, thus elevating the leg 7 and the arm 3, and consequently raising the stylus out of the sound-groove in the disk. The knife-edge 10 then comes into contact with the slanting side of the selected adjacent tooth in the rack 12, and as it descends toward the root of such tooth a reverse movement is imparted to the reproducer-arm, setting it back, and then the trigger, being released, the stylus enters the sound-groove at a definite point distant from which it was removed and is caused to travel again along the groove, and so repeat any desired portion of the record less than the whole. As is obvious, this repetition may be effected any number of times and at any point in the travel of the reproducer.

The invention is not limited to the details of arrangement of the trigger.

The value of the attachment will readily occur to any one engaged in teaching languages, music, and other subjects where inflection, pronunciation, enunciation, and the like are of importance.

What I claim is—

1. The combination with a reproducer, its support, its stylus, and a record-disk, of a repeating mechanism for shifting the reproducer as often as desired at any point within the length of the groove in the disk as it travels therein, comprising essentially means to raise the stylus out of the groove as the record-disk rotates, said means coöperating with means to

move said stylus laterally a limited distance and arrest its lateral motion and return it to the groove in the rotating disk at any desired point between the ends of the groove to repeat
5 any desired portion of the record less than the whole.

2. In a repeating mechanism for phonographs, a horizontally-swinging reproducer-arm, a hand-actuated trigger applied to it and
10 capable of raising its stylus out of the sound-groove, a knife-edge on said trigger, and a ratchet-tooth rack with any selected tooth of which said knife-edge coöperates to shift the
15 reproducer-arm backwardly at any point in its travel less than the whole.

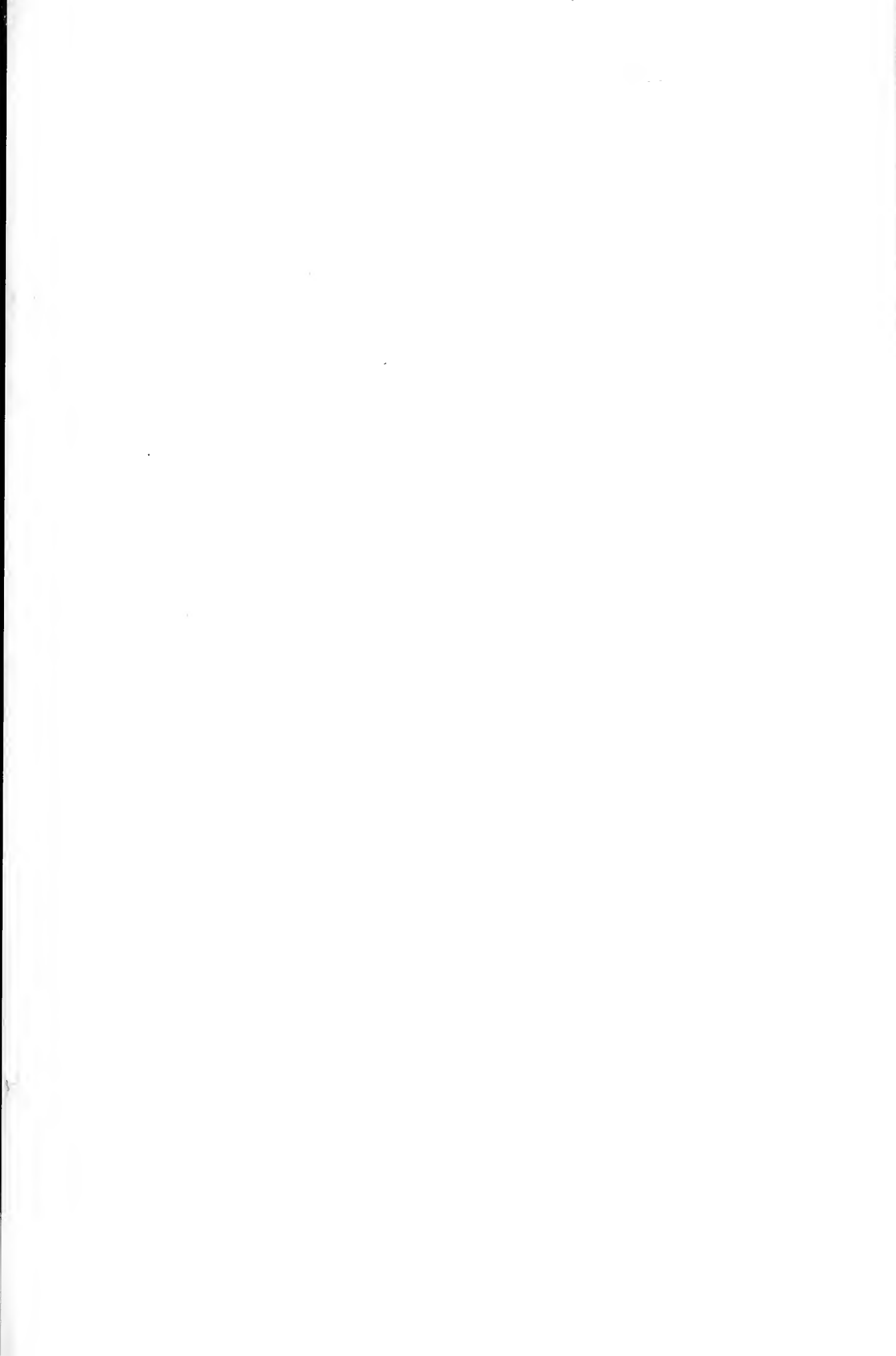
3. The combination with a disk sound-reproducer, of a horizontally-swinging reproducer-arm having a stylus, of a trigger pivotally connected with said arm and carried by it, a knife-edge on said trigger, and a ratchet-tooth
20 rack stationarily mounted beneath the knife-edge and coöperating with it to reverse the reproducer-arm to effect repetition of any portion of the record.

In testimony whereof I have hereunto set
25 my hand this 26th day of May, A. D. 1903.

HARRY P. HUSE.

Witnesses:

FRANK K. STOCKETT,
NANNIE S. STOCKETT.



No. 767,343.

PATENTED AUG. 9, 1904.

H. P. HUSE.
REPEATING MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED DEC. 4, 1903.

NO MODEL.

Fig. 1.

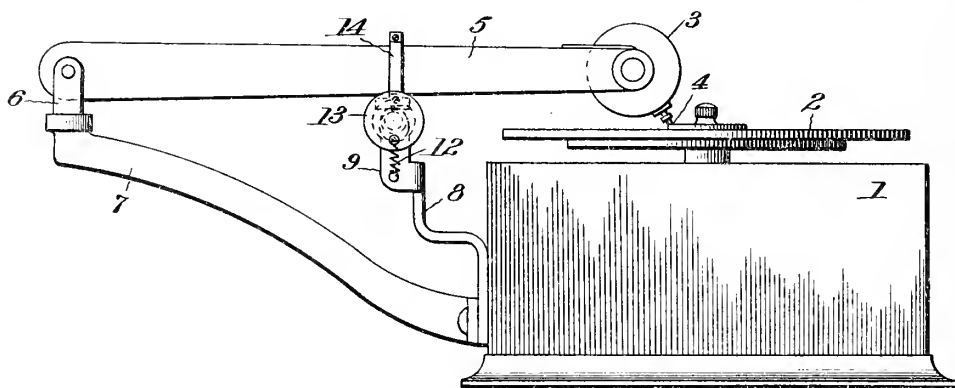


Fig. 2.

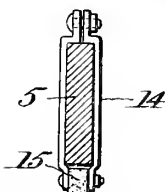


Fig. 3.

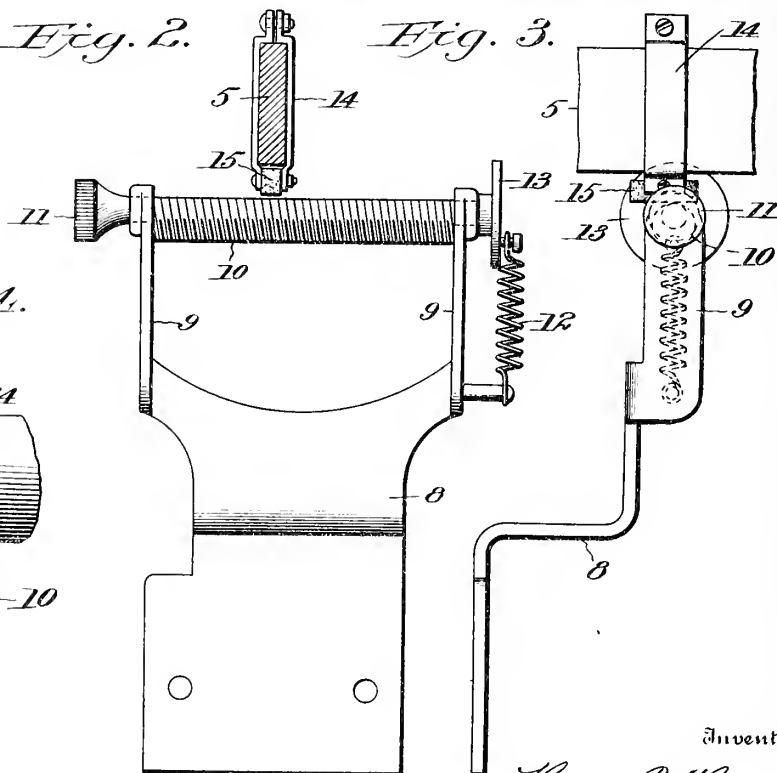
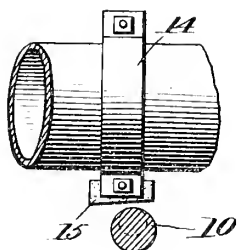


Fig. 4.



Witnesses
C. N. Walker
Ed. Linnard

Inventor
Harry P. Huse
by *Wm. F. Finckel*
Attorney

UNITED STATES PATENT OFFICE.

HARRY P. HUSE, OF THE UNITED STATES NAVY, ASSIGNOR TO UNITED STATES SCHOOL OF LANGUAGES, OF WILMINGTON, DELAWARE; A CORPORATION OF DELAWARE.

REPEATING MECHANISM FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 767,343, dated August 9, 1904.

Application filed December 4, 1903. Serial No. 183,779. (No model.)

To all whom it may concern:

Be it known that I, HARRY P. HUSE, of the United States Navy, temporarily residing at Naval Academy, Annapolis, Maryland, have
 5 invented a certain new and useful Improvement in Repeating Mechanisms for Phonographs, of which the following is a full, clear, and exact description.

The object of this invention is to provide
 10 means for repeating any portion, especially any portion less than the whole, of a sound-record on a disk phonograph.

The invention consists of a repeating mechanism for phonographs comprising an eccentrically-arranged bar screw-threaded or otherwise constructed to engage a tractive projection on the sound-box arm and move said
 15 arm laterally, as I will proceed now more particularly to set forth and finally claim.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a side elevation of a phonograph supplied with the attachment of the present invention.
 25 Fig. 2 is an end view of the attachment. Fig. 3 is a side view thereof. Fig. 4 is a side view of a slightly-different form of part of the attachment.

The box 1, the rotating record or sound
 30 disk 2, the sound-box 3 and its stylus 4, the sound-box arm 5, and the swivel connection 6 of said sound-box arm, with its supporting-bracket 7, may be of usual or any approved construction. Adjacent the bracket 7 and
 35 preferably by means of its fastening-screws there is applied to the box 1 a bracket 8, having ears 9, in which is journaled the bar 10, provided with a fine screw-thread and having a turning device, such as a milled head 11.
 40 This bar is mounted eccentrically in the ears 9, and its shortest radius is normally presented upward by means of the drag of the spring 12 on an eccentric connection, disk, crank, or other equivalent device 13, applied to one end
 45 of the said bar.

14 is a clamp of suitable construction to embrace whatever form of arm 5 may be em-

ployed, and in Figs. 1, 2, and 3 this arm is shown as rectangular in cross-section, while in Fig. 4 it is shown as tubular, and, as al-
 50 ready stated, the clamp 14 is conformed to the shape of the arm. In the lower portion of this clamp is placed a piece of tractive material 15, such as leather or rawhide.

The sound-box, through its stylus, travels
 55 over the rotating sound-record disk 2 in the usual way. The normal position of the bar 10 takes it out of contact with the tractive material 15, and consequently the sound-box and its stylus are free to be carried by the
 60 rotating sound-disk; but if it be desired to repeat any portion of the record, especially any portion less than the whole, and to repeat it any number of times the bar 10 is rotated so
 65 as to bring a portion of its surface of greater radius upward and into contact with the tractive material, and thereby to lift the arm 5 until its stylus is free from the sound-groove, when upon further rotation of the bar the
 70 sound-box arm will be moved laterally in a reverse direction from what it is given by the travel of its stylus in the sound-groove. The tractive material under the weight of the arm engages the screw-thread in the bar, and the rotary motion of the bar is converted into a
 75 lateral motion of the arm.

By the term "screw-threaded" as herein used I mean to include equivalent mediums by which the bar 10 will act upon the projection
 80 of the sound-box arm to move said arm laterally, as described.

The tractive device may have a straight contact edge, as shown in Figs. 1, 2, and 3, or such edge may be inclined, as shown in Fig.
 85 4. With a given shaft the extent of setback of the sound-box arm may be controlled within limits by bringing the tractive device nearer the shaft, so that as the shaft is turned it engages sooner the said tractive device, and
 90 thus brings to bear a longer arc of the thread in one turn, and hence lifts and displaces the stylus a greater distance. The tractive device with the slanting or inclined edge insures the longer lateral movement of the arm.

While this lateral motion of the arm is being effected the record-disk may continue to revolve.

5 The special value of the mechanism of the present invention is found in its adaptability to repeating words or phrases over and over again in teaching languages by means of the phonograph or so-called "talking-machine."

What I claim is—

10 1. A repeating mechanism for phonographs, comprising an eccentrically-mounted screw-threaded bar, and a tractive device applied to the sound-box arm and adapted to cooperate with said bar.

15 2. The combination with a phonograph-box, of a bracket, a screw-threaded bar eccentrically mounted in said bracket and adapted to be rotated therein, a sound-box arm, and a tractive device applied to said arm over said
20 eccentric bar.

3. The combination with a phonograph-box, of a bracket, a screw-threaded bar eccentrically mounted in said bracket and adapted to be rotated therein, a sound-box arm, a trac-

25 tive device applied to said arm over said eccentric bar, and means to normally hold said eccentric bar with its surface of less radius uppermost and out of contact with the tractive device.

30 4. A repeating mechanism for phonographs, comprising an eccentrically-mounted screw-threaded bar, and a tractive device having a slanting contact-surface applied to the sound-box arm and adapted to cooperate with said
35 bar.

35 5. A repeating mechanism for phonographs, comprising an eccentrically-mounted screw-threaded bar, and a tractive device adjustably applied to the sound-box arm and adapted to cooperate with said bar.
40

In testimony whereof I have hereunto set my hand this 30th day of November, A. D. 1903.

HARRY P. HUSE.

Witnesses:

THATCHER CLARK,
NANNIE S. STOCKETT.



No. 768,567.

PATENTED AUG. 23, 1904.

A. J. MUNDY.
SUBMARINE SIGNALING.
APPLICATION FILED APR. 23, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

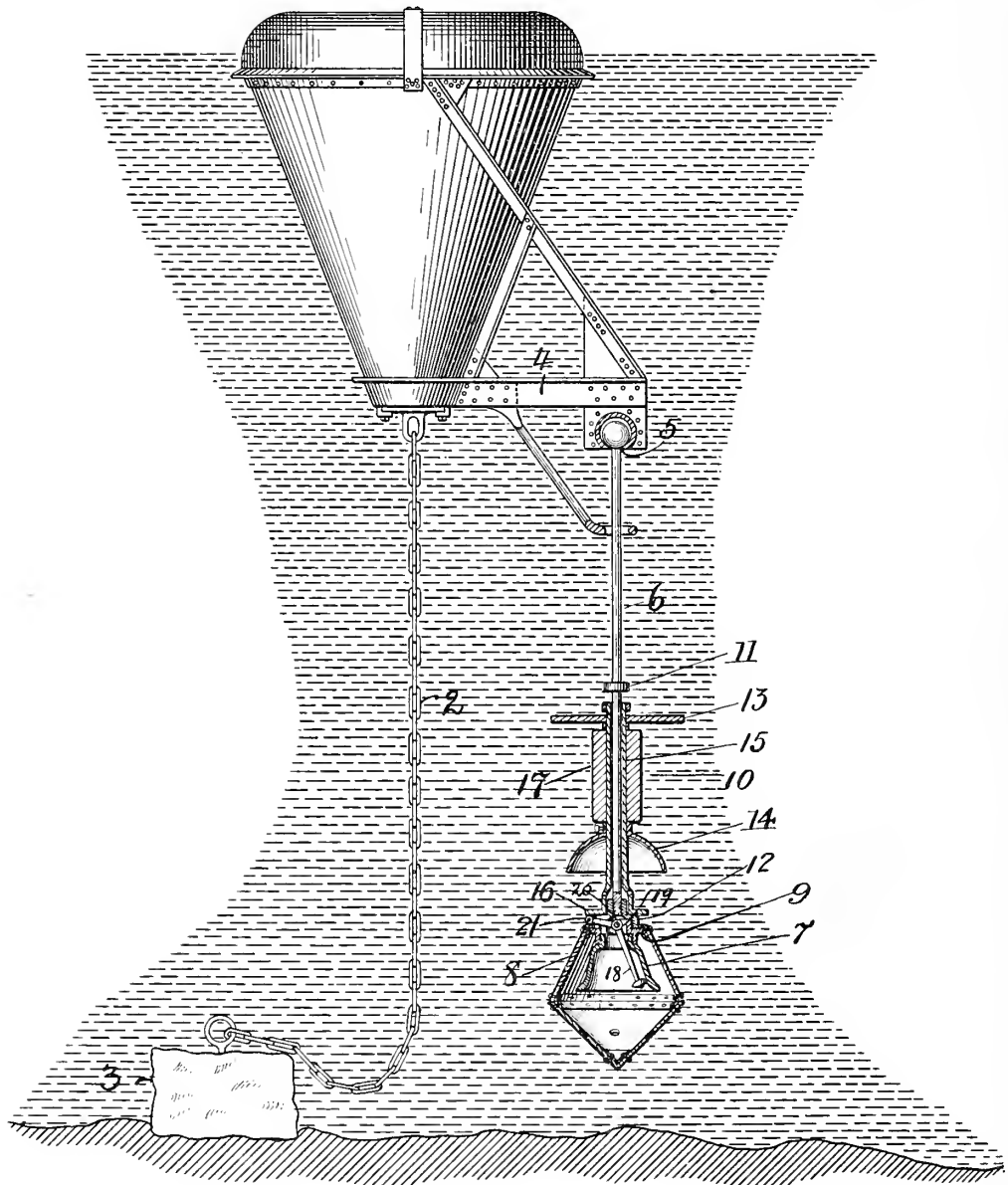


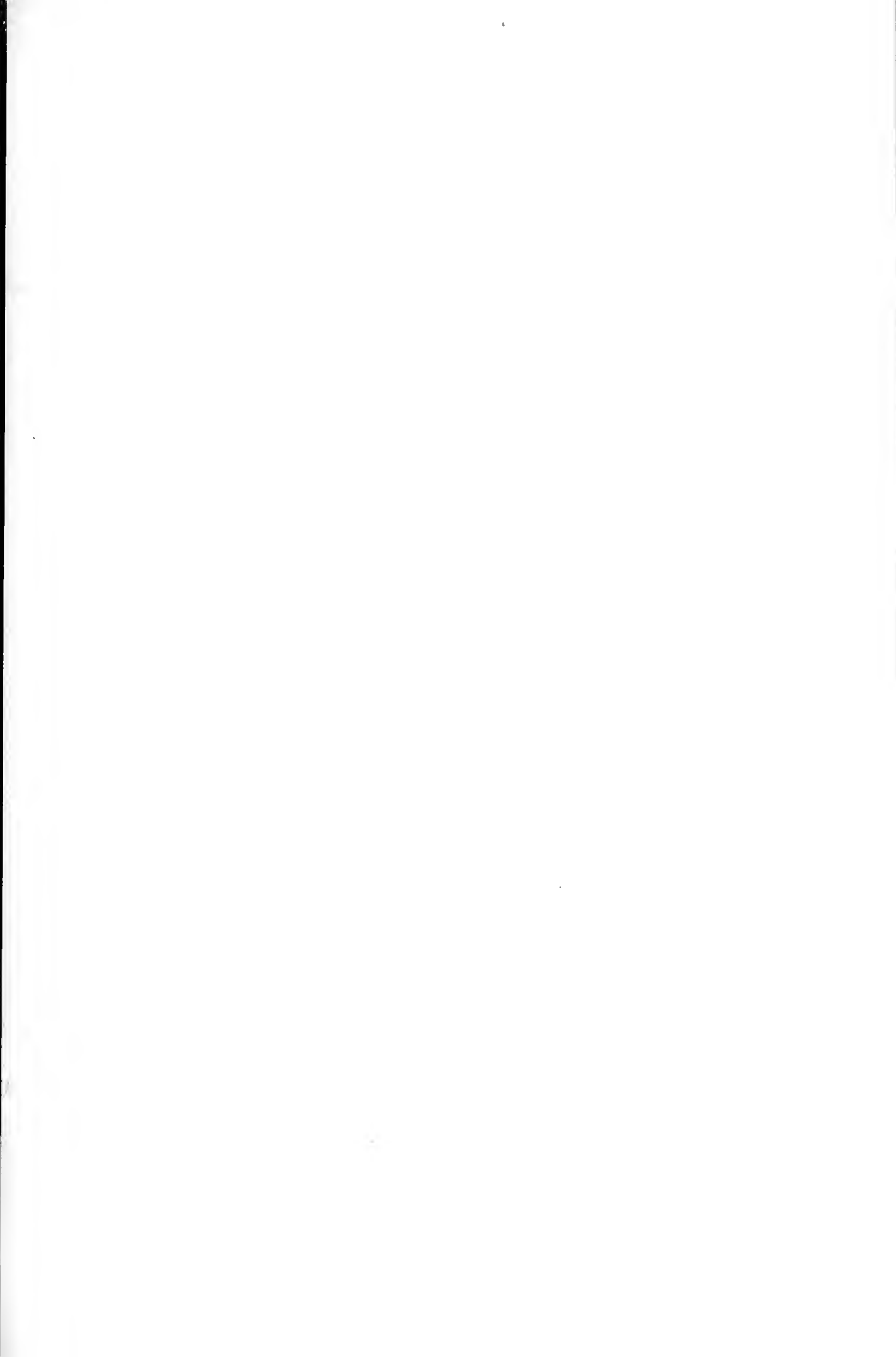
Fig. 1.

WITNESSES.

J. M. Dulan,
Saul S. Epstein

INVENTOR

Arthur J. Mundy.



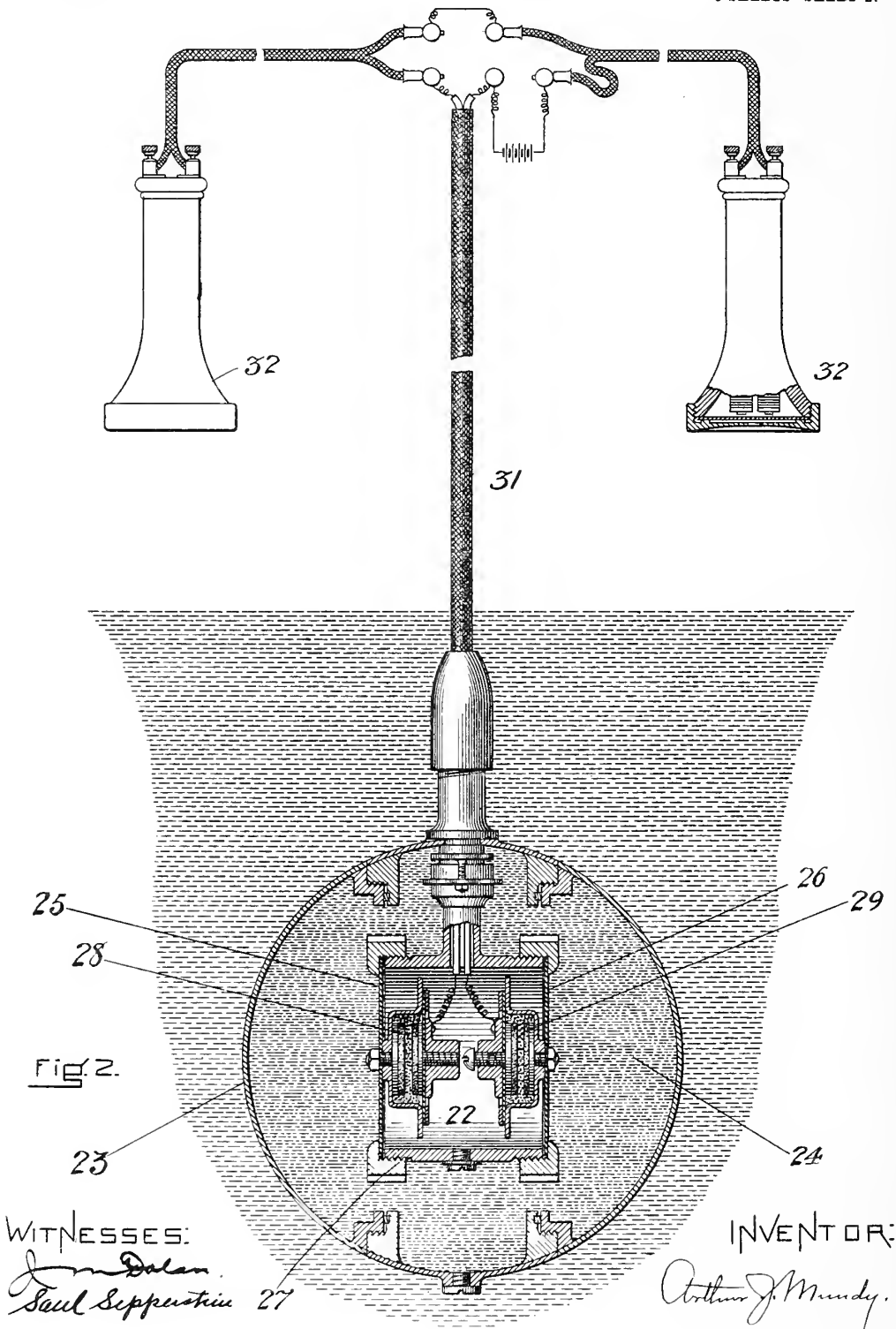
No. 768,567.

PATENTED AUG. 23, 1904.

A. J. MUNDY.
SUBMARINE SIGNALING.
APPLICATION FILED APR. 23, 1902.

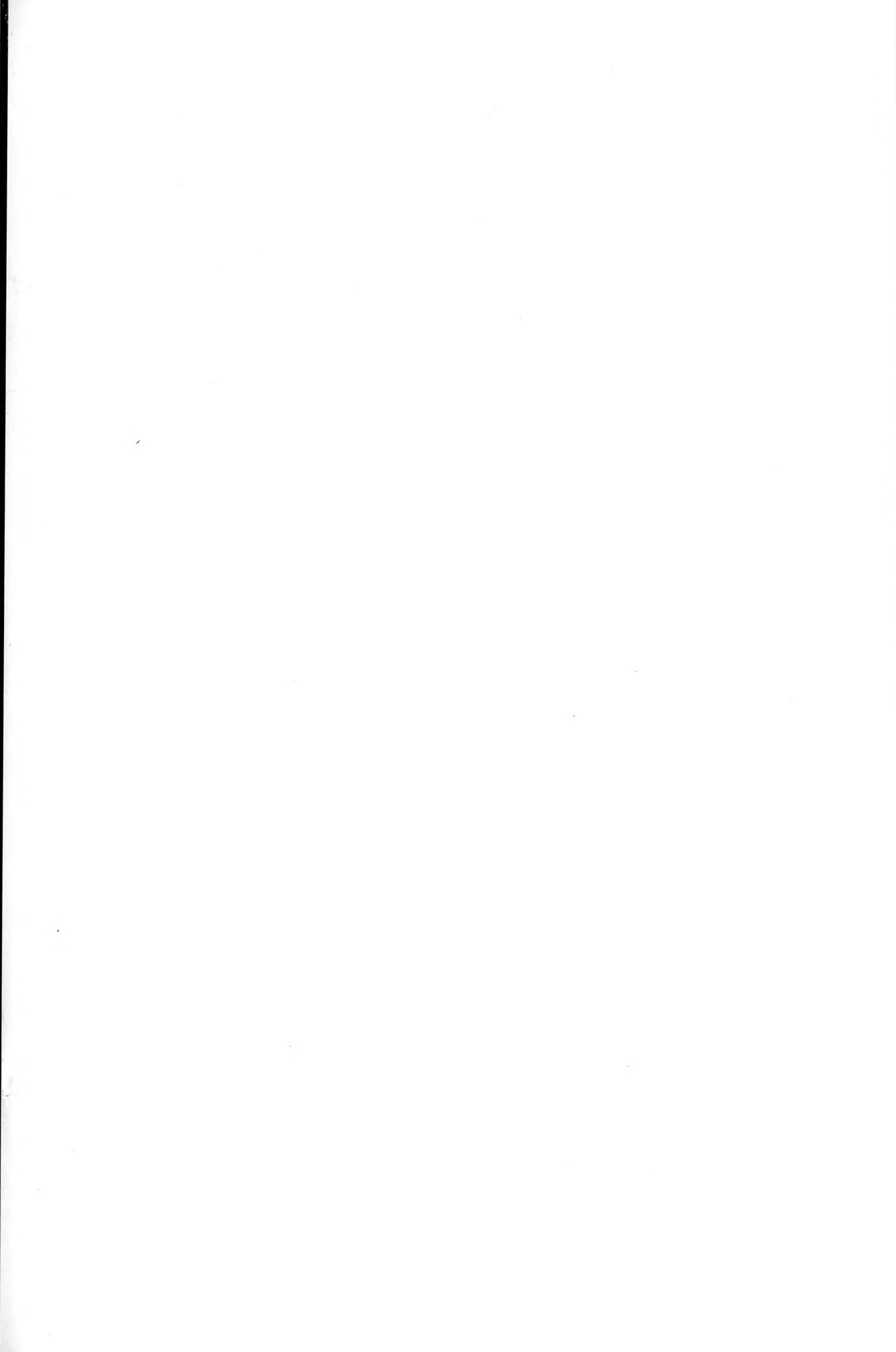
NO MODEL.

3 SHEETS—SHEET 2.



WITNESSES:
J. M. Dulan
Saul Seppert 27

INVENTOR:
Arthur J. Mundy



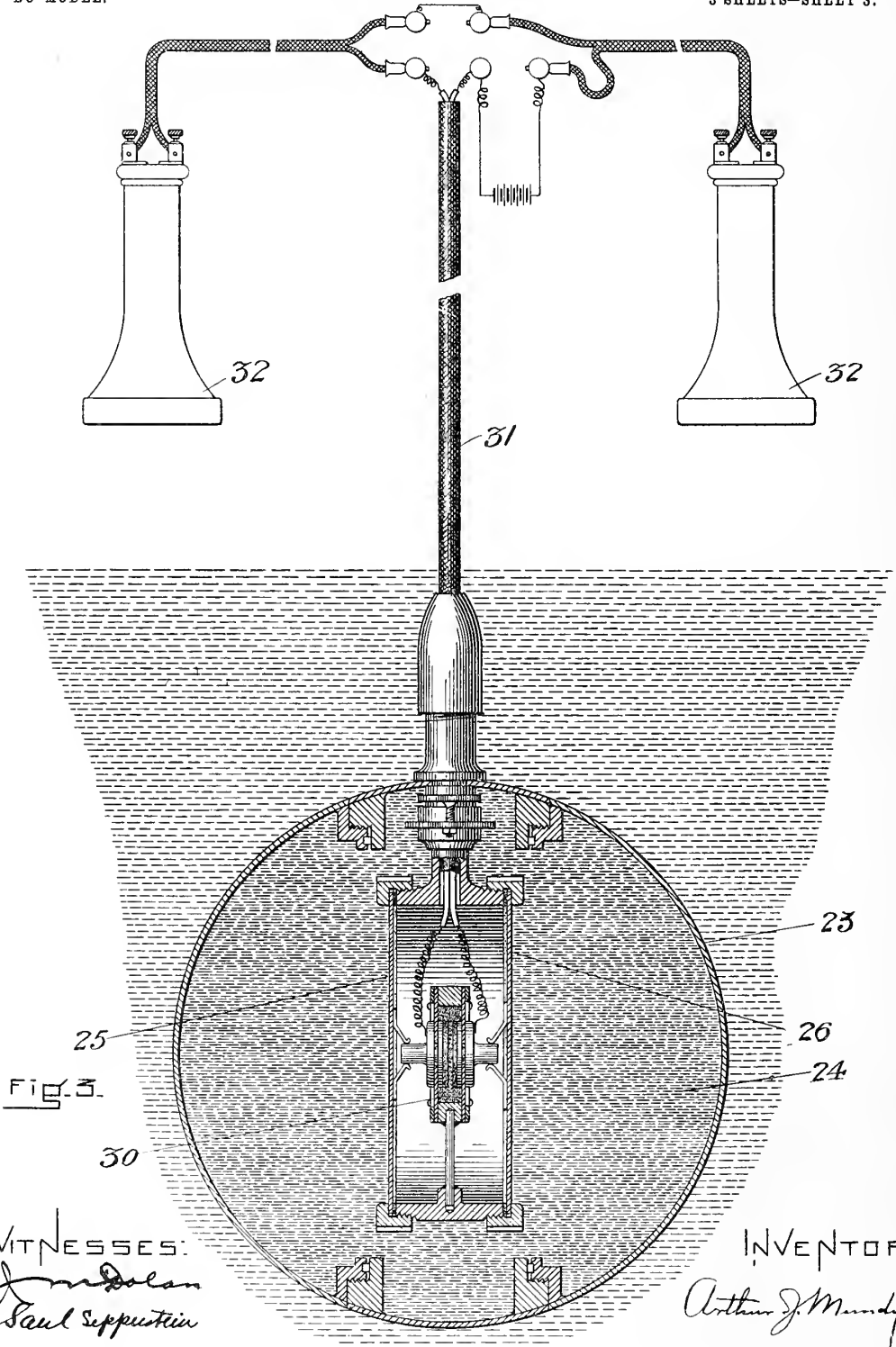
No. 768,567.

PATENTED AUG. 23, 1904.

A. J. MUNDY.
SUBMARINE SIGNALING.
APPLICATION FILED APR. 23, 1902.

NO MODEL.

3 SHEETS—SHEET 3.



WITNESSES:
Jordan
Saul Seppstein

INVENTOR:
Arthur J. Mundy

UNITED STATES PATENT OFFICE.

ARTHUR J. MUNDY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO SUBMARINE SIGNAL COMPANY, OF WATERTOWN, MAINE, A CORPORATION OF MAINE.

SUBMARINE SIGNALING.

SPECIFICATION forming part of Letters Patent No. 768,567, dated August 23, 1904.

Application filed April 23, 1902. Serial No. 104,293. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. MUNDY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Submarine Signaling, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

My invention relates to a method of submarine signaling in which the energy of the mechanical or wave motion of the conducting medium itself is transformed at points within itself into energy in the form of sound-waves, which waves are thereupon conducted by said medium to other points within it and are there gathered and delivered to actuate the diaphragm of a receiving instrument. The energy arriving at the receiving-station in the form of sound-waves is preferably relayed by means of an electric transmitter to an electric receiver, but may of course be at once conveyed by any suitable sound-conductor directly to the operator's receiving instrument without relaying.

The automatic production of sound in water must depend upon a relative movement of the sound-producing body and the mechanism for sounding the same. A bell is perhaps the simplest and best exemplification of such a sound-producing device. Heretofore for one reason or other the production of sound automatically has failed of accomplishment. In fact, until recently no device of the character just referred to adapted for the automatic production of sound had been successfully operated in any way whatever, whether manually, automatically, or otherwise, so as to produce sounds of sufficient intensity and clearness of note to be of practical and commercial value for signaling purposes. This condition existed for years, although eminent engineers recognized the probable value and the possibilities of such a device and vainly endeavored to produce it. Their efforts and experiments were acknowledged failures.

Of course I am aware of the existence of a

number of patents, both United States and foreign, alleging to disclose successful signaling systems of this type. The inoperativeness of such alleged systems appears in most instances on the face of the patents in the insufficiency of the disclosure, and in other instances actual experimentation under the most favorable conditions has demonstrated their inoperativeness. I am also aware of the existence of patents relating to other types of signaling apparatus—such, for instance, as that in which sounds are produced in the water by means of steam injected therein. An inventor of a device of such type states that his invention was evolved only after experimentation had convinced himself of the utter inoperativeness of a bell for submarine purposes. I have found, on the contrary, that a bell is probably the most efficient and desirable of all sound-producing devices, provided the same is properly constructed and operated, and I have claimed such a device in patents heretofore granted to me.

My present invention goes a step farther than the mere successful operation of various types of submarine sound-producing devices. It relates to the successful automatic operation of such devices. Hitherto it has not been found that a bell or other device submerged in the water could be operated by virtue of the motion of the water alone. The difficulties in the way of the automatic operation of a submerged bell, for instance, are many. In the first place the natural movement produced by a wave upon a device suspended or floating in the water is almost entirely up and down, and it is not a lateral or rocking motion, such as would cause the freely-suspended clapper of an ordinary bell to strike the same. Again, whatever rocking motion the body of such a bell might receive by virtue of its suspension is resisted by the mass of the water itself. Any impulse of the water tending to rock the bell-body tends also to rock the clapper within it, and the slight differential movement of the two, due to gravity or relative inertia, produces but a faint contact, if any at all. Even this movement, however, is opposed by the

presence of the water between the bell and clapper. Provided, however, that the action of the clapper or the bell is not impeded by the water between the two, the contact of the water on the outside of the bell acts to so dampen any vibration of the same that all blows of the clapper must be clear and powerful to produce any effect. The mere falling of the hammer against bell by reason of its gravity is hardly sufficient to sound the bell, even if the fall is unimpeded.

For the above reasons and for various other causes, some inherent to the particular device under experimentation, bells and other devices have not previous to my invention been successfully automatically operated. So far as I am aware, I am the first to operate a bell by the natural power of the medium in which the resulting sound is transmitted. I accomplish this result by means of the apparatus hereinafter described, in which the parts are so constructed and interconnected that the up-and-down or wave motion of the water imparts to the sounding mechanism sufficient energy to cause the latter to violently throw the striker against the bell in spite of intervening water and other adverse influences such as mentioned. The sound-waves thus produced are conducted by the water to my receiving apparatus, by means of which apparatus the sound is collected and forwarded to the operator.

Having set forth the object and nature of my invention I will describe apparatus for effecting the same, reference being had to the accompanying drawings, in which—

Figure 1 represents in elevation my improved means for automatically producing sound. Fig. 2 represents in cross-sectional elevation a form of my improved sound receiving or collecting apparatus. Fig. 3 represents a modified form of sound-receiving apparatus, also in cross-sectional elevation.

Referring to Fig. 1, 1 is a metal buoy of the usual type and which is anchored in any desired place by an anchoring-chain 2 and anchor 3. It supports a bracket 4, from which is suspended, by means of a ball or jointed connection 5, a rod 6. This rod carries at its lower end a bell 7, which may be inclosed in a protecting-case 8, attached to the flanged collar 9, secured to the neck of the bell. This case is preferably of galvanized iron and incloses the bell upon its sides and bottom, but does not come in contact with them, the purpose being to prevent the bell and its hammer from being fouled by seaweed or other things. It is not intended to form a water-tight compartment, however, and it is provided with holes by means of which the water may enter and fill it, and thus be brought into contact with the bell. The rod carries a sea-anchor 10, which is attached thereto in a manner to permit of its movement and that of the bell with relation thereto, the movement being re-

stricted in one direction by a collar 11, attached to the rod, and in the other direction by the sleeve 12, by which the bell is secured to the rod.

The sea-anchor may be of any usual type, and I have represented one provided with the wide circular flange 13 and with the bell-shaped sleeve 14. They are both attached to a long sleeve 15, through which the rod extends and which sleeve has a wide flange 16 at its lower end. The sea-anchor also carries a buoy 17 below the flange 11 and for the purpose of sustaining its weight. The bell has a hammer 18, which is attached to the collar 19 by a rock-shaft 20, having an arm 21, which projects outside the bell to a position beneath the flange 16.

Upon the movement of the buoy 1 the rod suspending the bell is moved and caused to rise or fall with respect to the sea-anchor, and when it rises it causes the arm 21 of the bell-hammer rock-lever to come into contact with the sleeve-flange 16, and thus cause the hammer to be swung against the bell and deliver to it a stroke which produces sound-vibrations, and which sound-vibrations are delivered to the surrounding water and transmitted by it. As the buoy 1 is swung or moved by the movement of the water in which it is these movements continue to cause variations in position between the sea-anchor and the bell, whereby the bell is caused to be rung as the two approach each other.

It will be understood that normally the sea-anchor is sustained by its buoy so that it rests, if at all, but little upon the arm that actuates the hammer of the bell. It is not, however, readily movable in the water in either direction, but permits the buoy to move the bell with respect to it, so that the movement of the bell by the buoy causes the bell-hammer arm to be brought into contact with the depending part of the sea-anchor, and thereby operate the bell-hammer to strike the bell. Every movement of the main buoy is thus communicated to the bell and bell-hammer. While, however, the sea-anchor thus acts it may be changed in position by the main buoy gradually as it is dragged by it; but this does not affect or change its operative relation to the bell and bell-hammer as above expressed.

The receiving apparatus (shown in Figs. 2 and 3) consists of a duplicate receiving-transmitter 22, suitably mounted within a casing 23, containing a sound-conducting medium 24. The transmitter consists of diaphragms 25 and 26, closing the ends of a cylindrical chamber 27 and maintaining the same water-tight and coöperating in the case of Fig. 2 with two resistance-varying means 28 and 29 and in the case of Fig. 3 with a single resistance-varying means 30, said resistance-varying means being connected in series through the connection 31 with the operator's receiver 32.

Having described the principle of my invention and apparatus for carrying the same into effect, what I claim, and desire to secure by Letters Patent, is—

5 1. In an improved method of submarine signaling, the transformation of the energy of the natural motion of the water into energy in the form of sound-waves of a quality for submarine signaling, and the delivery of such
10 sound-waves to the water at a point below its surface.

2. An improved method of submarine signaling consisting in transforming the energy of the natural motion of the water into energy
15 in the form of sound-waves, delivering said waves to the water at a point below its surface, taking rays of such waves from the wa-

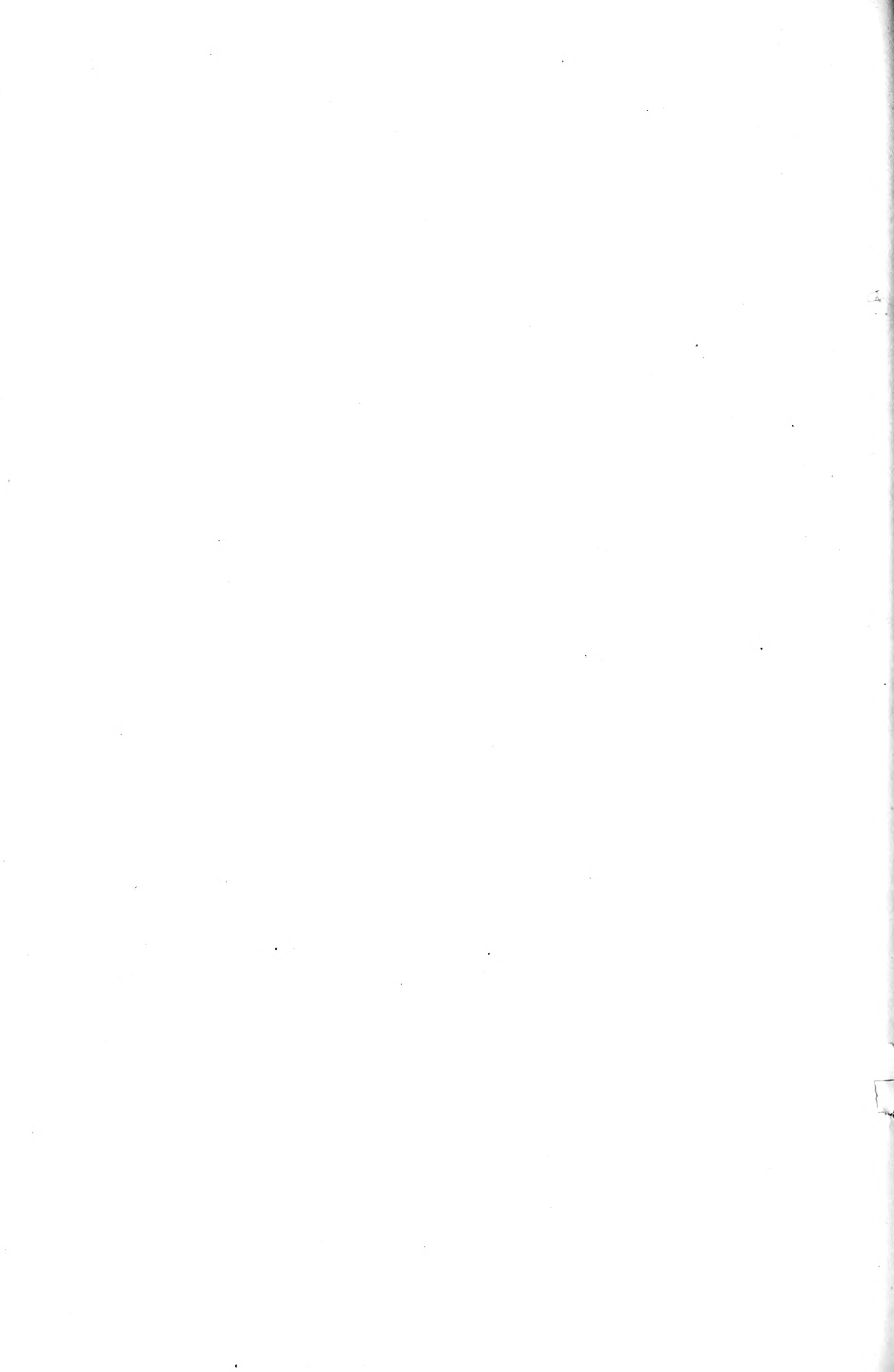
ter at a distant point and transmitting the collected rays to receiving means.

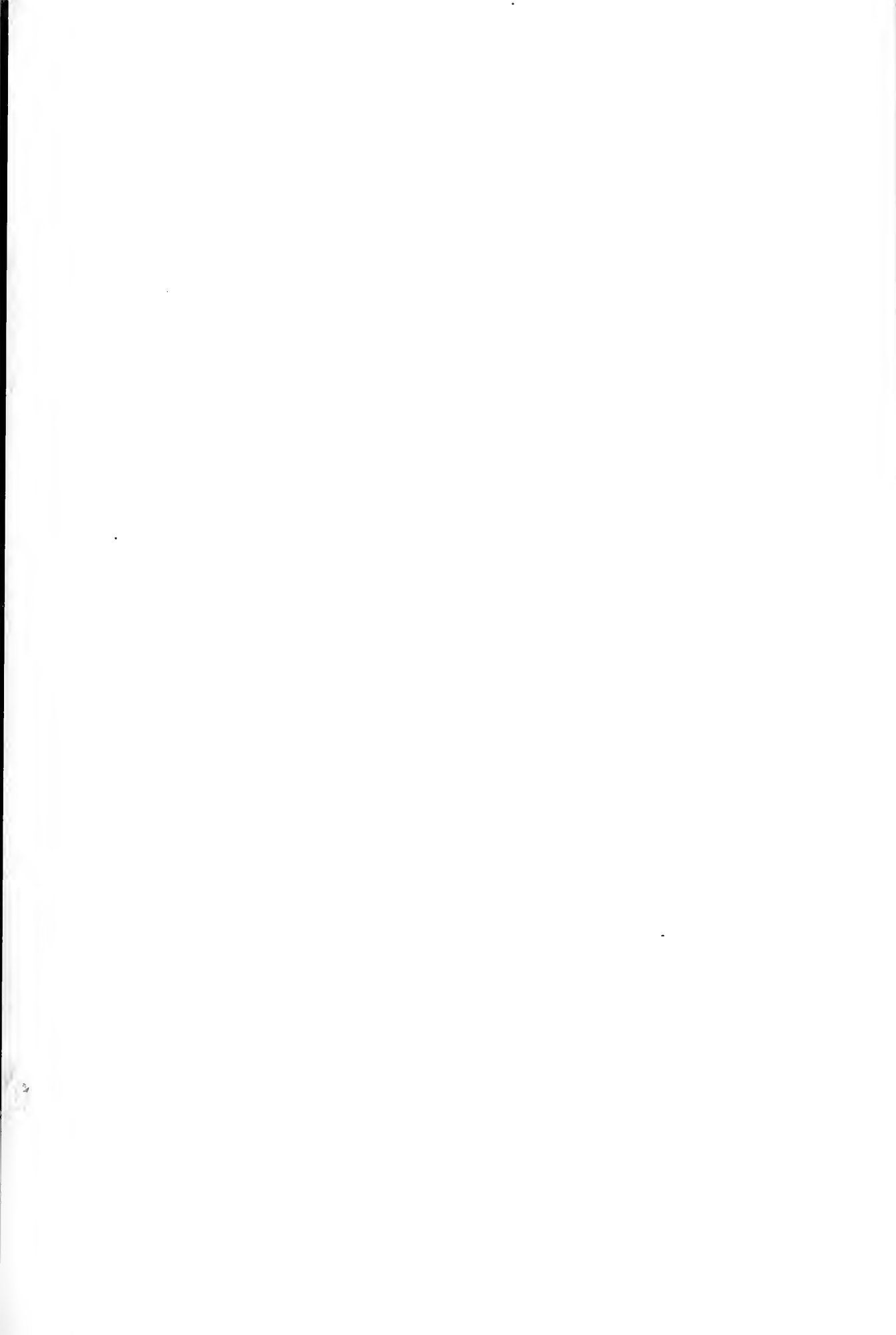
3. An improved method of submarine signaling consisting in transforming the energy of the natural motion of the water into energy in the form of sound-waves, delivering said waves to the water at a point below its surface, taking rays of such waves from the wa-
25 ter at a distant point, transforming the energy of such rays into electrical energy, and transmitting the electrical energy to receiving apparatus.

ARTHUR J. MUNDY.

Witnesses:

F. F. RAYMOND, 2d,
J. M. DOLAN.





No. 768,570.

PATENTED AUG. 23, 1904.

A. J. MUNDY.
SOUND TRANSMITTER AND RECEIVER.

APPLICATION FILED APR. 23, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

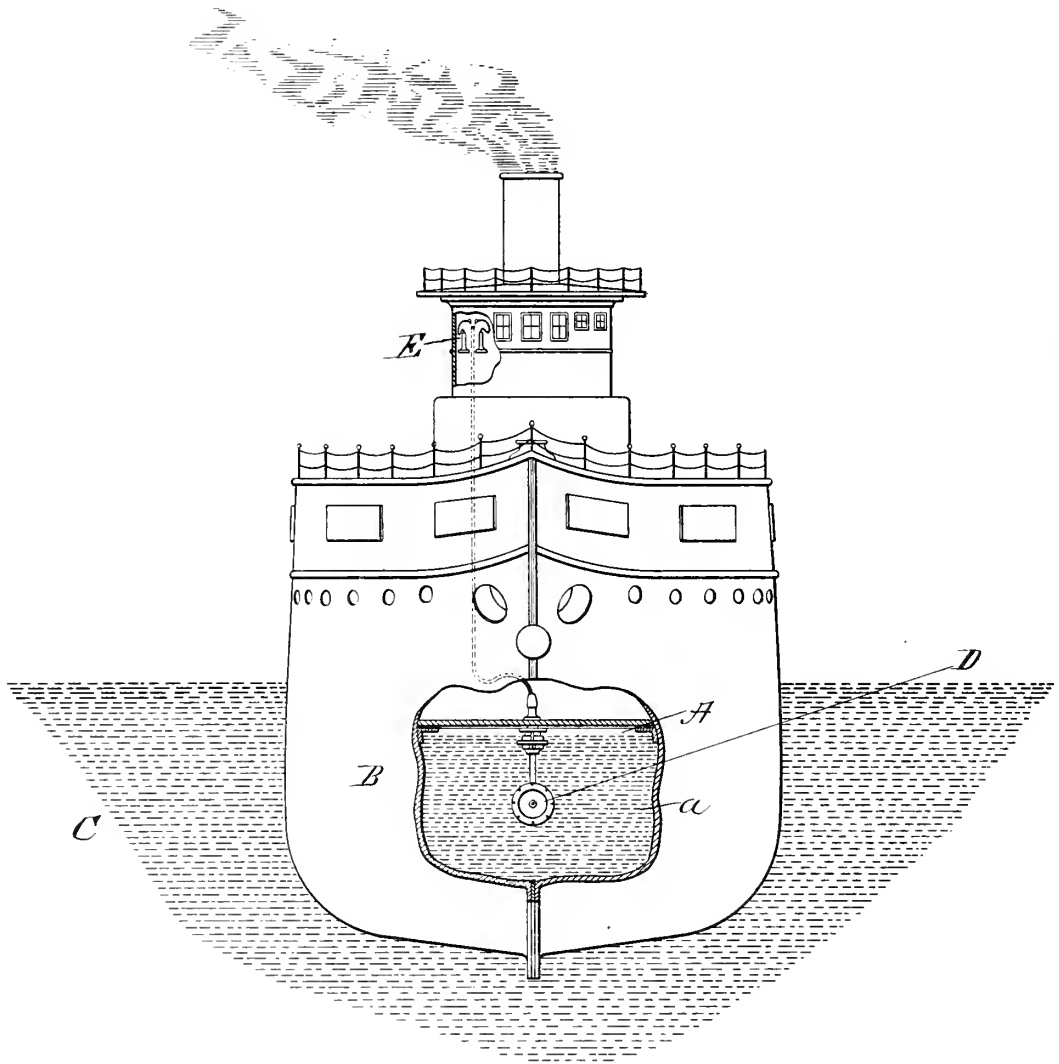


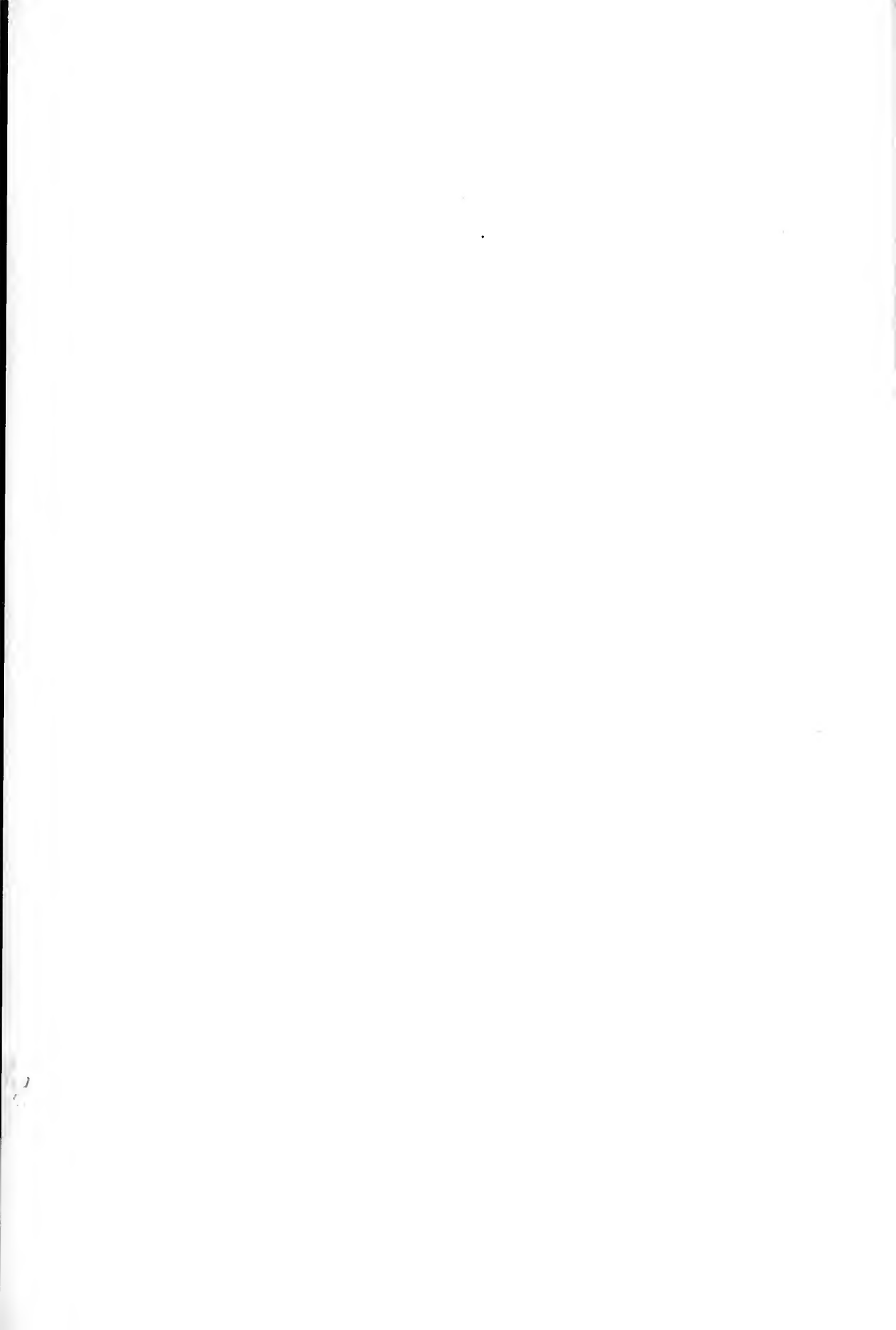
Fig. 1.

WITNESSES:

J. M. Dolan
Saul Sippertson

INVENTOR:

Arthur J. Mundy



No. 768,570.

PATENTED AUG. 23, 1904.

A. J. MUNDY.
SOUND TRANSMITTER AND RECEIVER.

APPLICATION FILED APR. 23, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

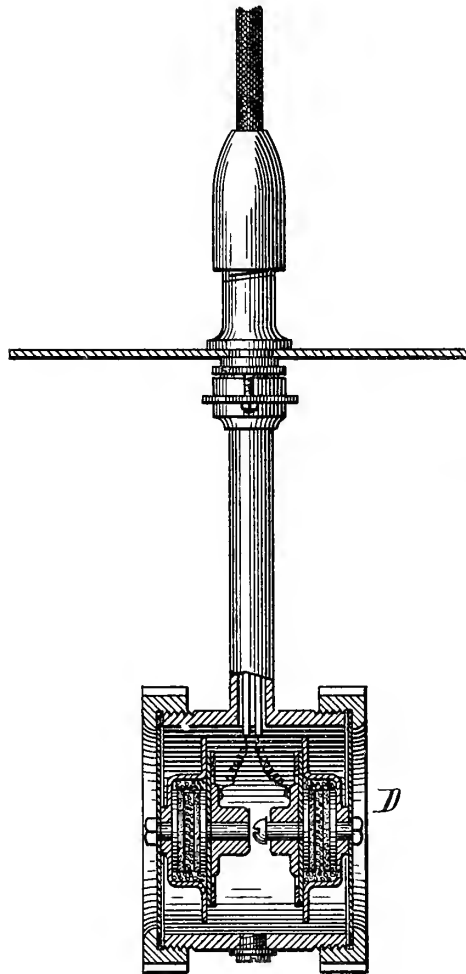


Fig. 2.

WITNESSES:

Jordan
Saul Sippenstein

INVENTOR:

Arthur J. Mundy

UNITED STATES PATENT OFFICE.

ARTHUR J. MUNDY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO SUBMARINE SIGNAL COMPANY, OF WATERTOWN, MAINE, A CORPORATION OF MAINE.

SOUND TRANSMITTER AND RECEIVER.

SPECIFICATION forming part of Letters Patent No. 768,570, dated August 23, 1904.

Application filed April 23, 1902. Serial No. 104,299. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. MUNDY, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Sound Transmitters and Receivers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

My present invention relates to submerged means for receiving sound-vibrations imparted at a distance to the water in which said means is submerged and transmitted by such water to said receiving means.

It has heretofore been believed that to obtain first-class results the diaphragm of the receiving-transmitter should be in direct contact with the open water or medium by which the sound was being transmitted and that the interposition of anything between the diaphragm and the open water impaired the effectiveness of the instrument. The efforts made in the past, however, to maintain the transmitter in contact with the transmitting medium have necessitated the adoption of apparatus having inconveniences and faults commensurable to those sought to be avoided. Delicate receiving instruments have been suspended directly in the open sea or have been mounted in the sides of ships and other vessels, the unprotected diaphragm being in all such instances liable to damage from floating and other obstacles and other sources of injury. Moreover, such apparatus when used in connection with ships presents when suspended from the ship the additional difficulty of keeping it submerged when the ship is moving or in flowing tides or currents, or when mounted in the side of the ship the difficulty of securing clear signals owing to the interfering noises created on shipboard and conveyed to the transmitter through the shell of the ship.

I have discovered that it is possible to increase the transmitter without injuriously affecting its responsiveness to sound-waves and

by the shell of the casing to protect it from damage from exterior agencies. The side of a ship may constitute a portion of such a protecting-shell and the ship, in such instance, the casing itself. In such case I provide for the use of a transmitter entirely within the ship, this being my preferred construction when my invention is used on shipboard.

I have discovered that although energy in sound-waves is ordinarily lost in passing from one medium to another, yet it is possible to interpose between the receiving-diaphragm and the source of sound a protecting or other shell, provided that the continuity of the transmitting medium is otherwise substantially unbroken—that is to say, if the medium within said interposed casing be of similar nature to that without, then, as a matter of fact, there is no material change in the transmitting medium, and consequently no material loss of energy in the transmission. Actual experimentation and use have demonstrated that the interposed shell apparently does not interfere with the passage of the waves through it, but delivers to the liquid upon one side thereof substantially the impulses received from the water on the other side.

In the location of the transmitter upon shipboard there is employed within the ship, and preferably against the side thereof, a tank, the shell or side of the ship preferably acting as one wall of the tank. This tank may be one of the water-ballast tanks of the ship or may be a specially-constructed tank. Within or in contact with the liquid of this interior tank the receiver, which may be of any desired type, is suitably suspended or otherwise mounted, and when so mounted the transmitting medium between the same and the sound-producing means without is practically continuous. The medium within the tank and with which the transmitter is in contact has the important function of insulating the transmitter from noises of local origin, such as traversing the frame and sides of the ship have heretofore interfered with and confused the actual signals in instruments where the transmitters have been mounted

directly in or on the walls of the ship. Such noises are apparently not delivered to the liquid of the tank in such a way as to affect my transmitter suspended therein. The signal-waves, however, striking the side of the ship pass through and into the tank, where they are collected by the transmitter and delivered to the operator. The use of a body of liquid within a casing as a means for receiving and transferring sound-vibrations imparted to the water without is also of value in that it permits of the employment of fresh water or other non-corroding liquid in contact with the transmitter, and it also permits of the pressure to which the transmitter is to be subjected being determined in advance, that it may be constructed to meet the requirements of such pressure, and in that it provides the transmitter with a constant pressure instead of a variable one, as is the case where the transmitter is used free or unrestrained in the outer water.

I shall describe the use of my invention in connection with a ship, and for a clearer exposition thereof reference is made to the following drawings, in which—

Figure 1 illustrates a steam vessel, bow on, with a portion removed to show the forward ballast-tank and the electrical transmitter contained therein. Fig. 2 is an end view, partly in cross-section, of the submerged receiving means.

Referring to the drawings, A represents a tank within a ship; a, the water therein; B, the shell of the vessel; C, the water in which it floats and moves, and D an electrical transmitter contained in the water-ballast tank and submerged in the water therein. This transmitter of the sound or signal vibrations is preferably electrical, and the one shown is that described in my copending application for Letters Patent of the United States, Serial No. 104,297, and need not be specifically described here, it being sufficient to say that the vibrations communicated to the water by the submerged signaling apparatus are transferred by the water and through the shell of the vessel to the water in the tank and by it to the diaphragms of the transmitter, and these diaphragms receive and electrically transfer them to the receiver E, which may be located in any part of the vessel. In the drawings it is represented as in the pilot-house of the vessel.

Having thus fully described my invention,

I claim and desire to secure by Letters Patent of the United States—

1. As a means for transmitting sound-vibrations transferred from a sound-signaling station through water, a liquid, sound-transmitting medium contained in a tank or other holder within a ship or other vessel, said medium being located to receive sound-vibrations transferred by the water in which the ship or other vessel floats, and an electric sound-transmitter in contact with said liquid contained in said tank or other holder and electrically connected with a receiver.

2. In a means for transmitting sound-vibrations through water from a sound-signaling station, a liquid sound-transmitting medium contained in a tank or other holder within a ship or other vessel in said water, said medium being located therein to receive sound-vibrations so transferred by the water in which the ship or other vessel floats, and a sound-transmitter in contact with said liquid contained in said tank or other holder.

3. As a means for transmitting sound-vibrations transferred from a sound-signaling station through water, a comparatively fluid sound-transmitting medium contained in a tank or other holder within a ship or other vessel in said water, said medium being located to receive and transmit sound-vibrations transferred thereto by the said water through the shell of the ship or vessel.

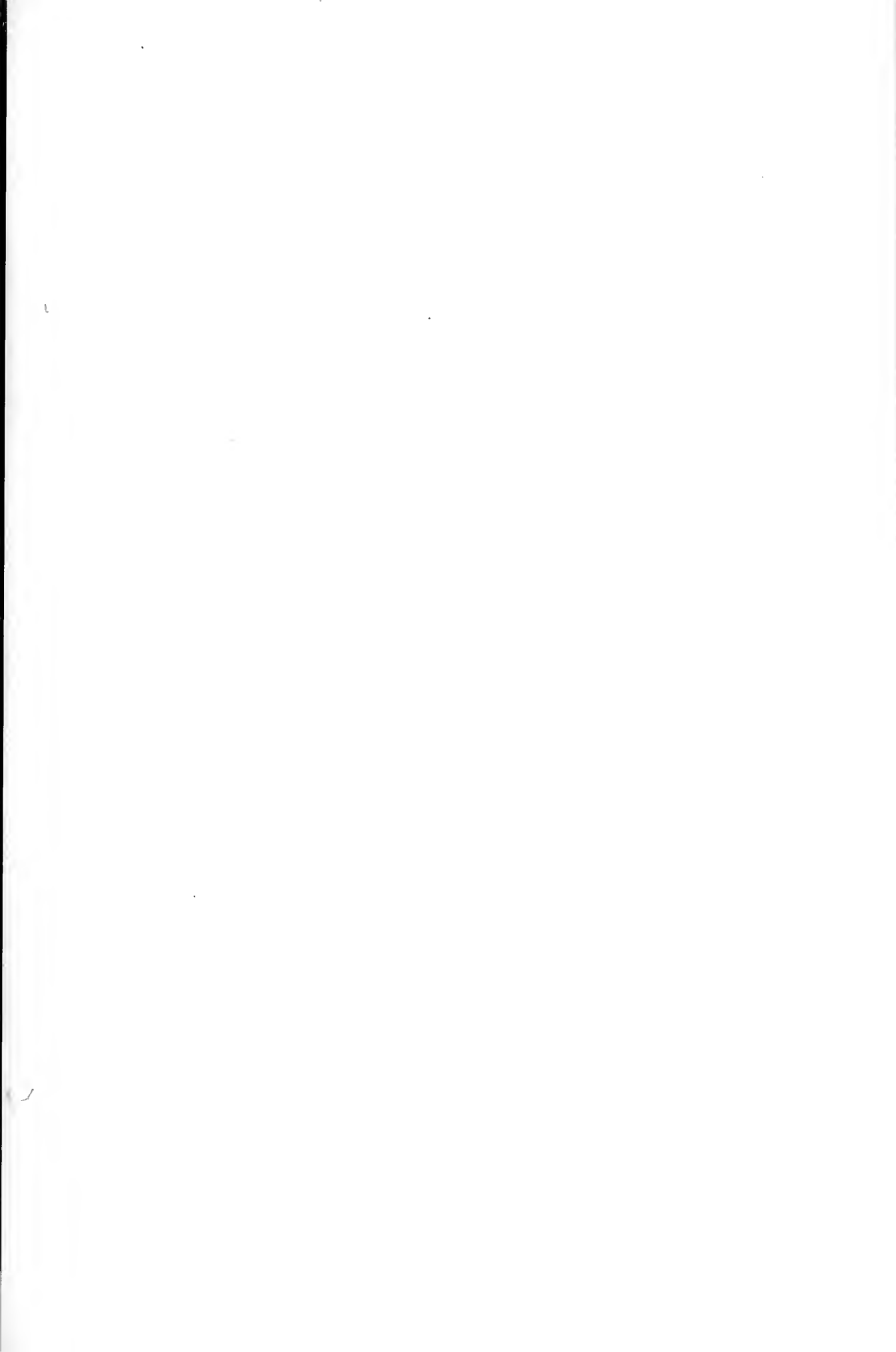
4. As a means for transmitting vibrations transferred from a sending-station through water, a liquid vibration-transmitting medium contained in a holder within a ship or other vessel in said water and located to receive and transmit the vibrations, transferred by said water, through the shell of the ship or vessel to it.

5. As a means for transmitting vibrations transferred from a sending-station through the water, a receptacle in contact with the water, a liquid vibration-transmitting medium contained in said receptacle, a sound-transmitter in contact with the transmitting medium in the receptacle, said medium lying between said transmitter and the wall of the receptacle in contact with the outer water, said receptacle shielding the transmitter from the outer water.

ARTHUR J. MUNDY.

Witnesses:

F. F. RAYMOND, 2d,
J. M. DOLAN.



No. 768,572.

PATENTED AUG. 23, 1904.

A. J. MUNDY.
SOUND TRANSMITTER AND RECEIVER.

APPLICATION FILED APR. 23, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

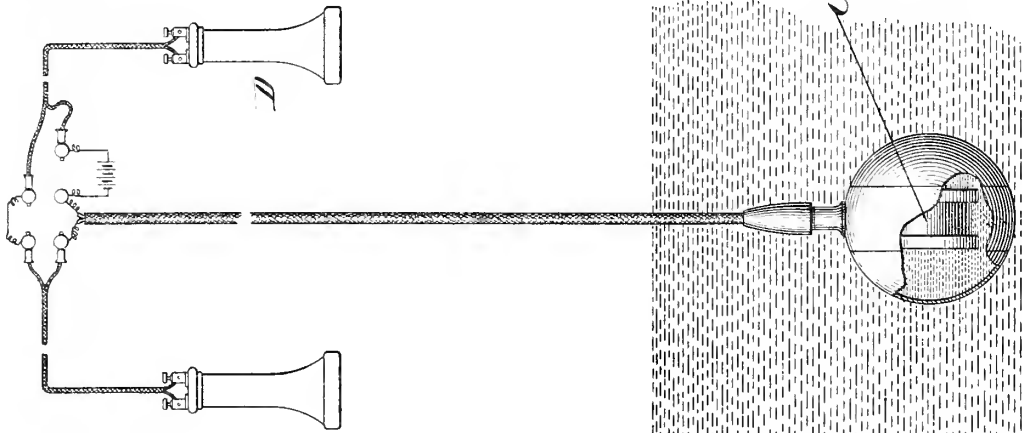
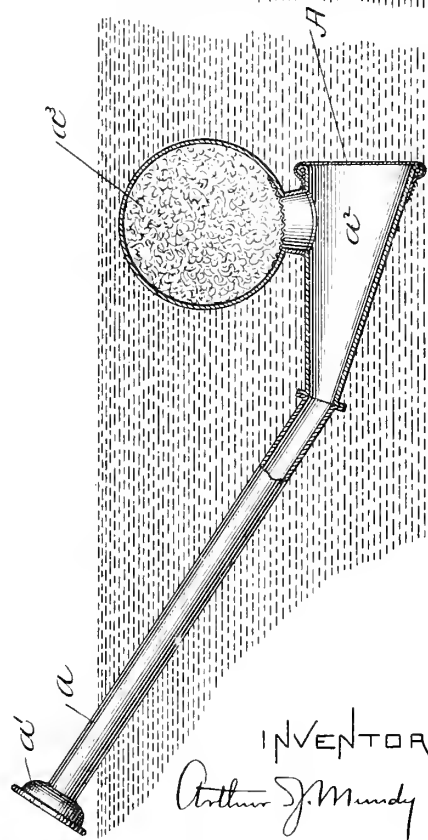


FIG. 1.



WITNESSES:

J. J. Dolan.
Saul Sappstein.

INVENTOR
Arthur J. Mundy.



No. 768,572.

PATENTED AUG. 23, 1904.

A. J. MUNDY.
SOUND TRANSMITTER AND RECEIVER.

APPLICATION FILED APR. 23, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

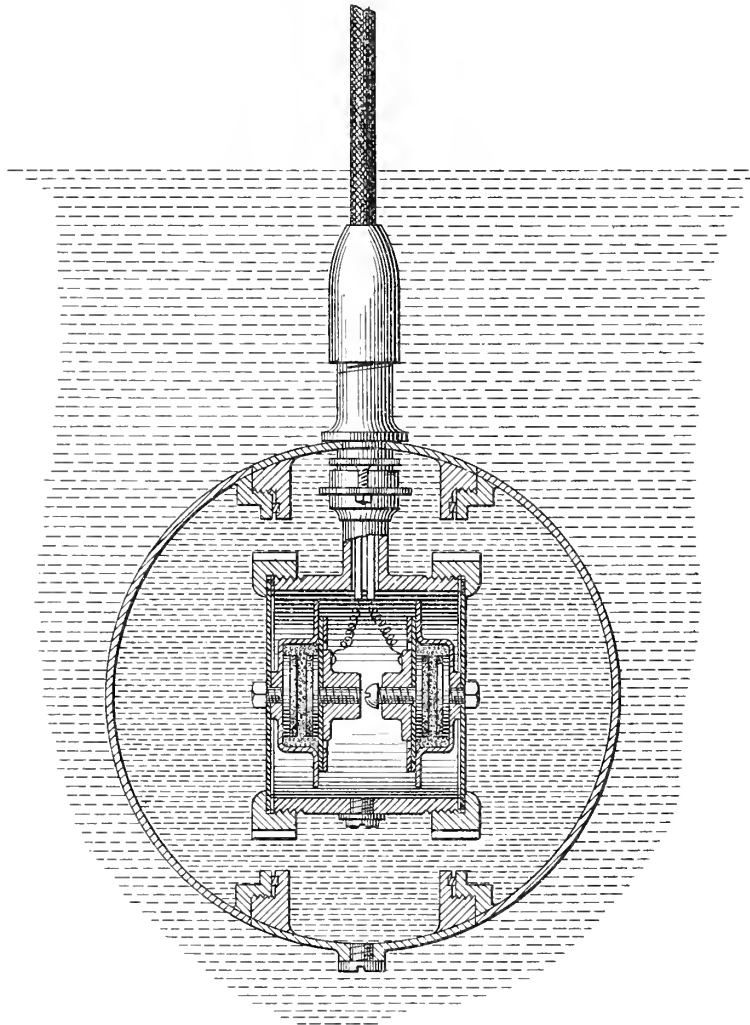


Fig. 2.

WITNESSES:

J. M. Dolan
Saul Sappenstein

INVENTOR

Arthur J. Mundy.

UNITED STATES PATENT OFFICE.

ARTHUR J. MUNDY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO SUBMARINE SIGNAL COMPANY, OF WATERVILLE, MAINE, A CORPORATION OF MAINE.

SOUND TRANSMITTER AND RECEIVER.

SPECIFICATION forming part of Letters Patent No. 768,572, dated August 23, 1904.

Application filed April 23, 1902. Serial No. 104,302. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. MUNDY, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Sound Transmitters and Receivers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to the transmission of articulate speech by water.

I have ascertained that an open body of water—like, for instance, the water of a pond, river, or sea—may be employed for receiving the vibrations of articulate speech, may transfer such vibrations, and deliver them to an electrical transmitter submerged in the water, by which they may be transmitted electrically to a receiver located out of the water and at any desired distance from the submerged transmitter.

In practicing the invention the vibrations of articulate speech are delivered by a submerged vibratory diaphragm with which the transferring water is in contact, and the vibrations thus transmitted to the water are received by a transmitter of peculiar construction which is submerged in the water and which transfers them electrically to a receiver.

In the drawings I have represented in a conventional way the means for practicing my invention.

Figure I is a view of my transmitting and receiving apparatus in partial cross-sectional elevation. Fig. II is a detail view, in cross-sectional elevation, of my receiving apparatus.

Referring to the drawings, A represents a vibratory diaphragm submerged in the water to any desired depth and upon one side in contact with the water. This diaphragm is vibrated by means of the sounds of articulate speech delivered to it through a speaking-tube a and from the mouthpiece a' thereof. I prefer that there be between the lower end

of the speaking-tube and the diaphragm A an enlarged chamber a^2 , from which opens a chamber a^3 , filled with a sound-absorbent and adapted to prevent excess of sound-reverberation in the chamber a^2 . The chamber a^2 has an enlarged end which is covered by the vibratory diaphragm, and thus permits of the employment of a diaphragm of any required size. The chamber a^3 may not be used. The chamber a^2 is somewhat in the nature of a megaphone, which acts to receive the sound and intensify it during its passage to its delivery end, so that the diaphragm is actuated with that intensity which this construction implies. The water in which the vibratory diaphragm is submerged may be, as I have said, any body of natural water—such as a pond, river, or sea or any other unconfined water—and the extent to which it will deliver the sound-vibrations depends upon the intensity with which they are delivered to the water and the sensitiveness of the sound-transmitter upon which the sound-vibrations thus imparted to the water operate or come into contact. B represents the water for so transmitting the vibrations of articulate speech.

C is the submerged transmitting device. It preferably comprises an electrical transmitter, one like that described in either of my applications for Letters Patent of the United States executed of even date herewith, Cases B and F, and contained in a sound-focusing shell like that described in my application for Letters Patent of the United States executed of even date herewith, Case E. The transmitter is electrically connected with the receiver D. A transmitter of this character intensifies the sound-vibrations delivered by it to the water both by focusing the vibrations upon the diaphragms by the direct contact of vibratory water with the diaphragms and by the simultaneous use of a number of sound-receiving diaphragms subject to the same influences and connected in series or multiple with the receiver, so that the transmitter is able to take from the water the vibrations of articulate

speech delivered to the water and to transmit them directly to the receiver by which articulate speech is delivered.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a system of submarine telephony, a means for imparting to water at a point beneath its surface the vibrations of articulate speech, and a submerged electric transmitter and receiver adapted to receive said vibrations so imparted to the water and to electrically transmit them to a sound-receiver.

2. In a system for submarine transmission of speech, a submerged means for imparting to water at a point below its surface the vibrations of articulate speech, and a submerged electric transmitter and receiver for taking said vibrations from the water and transmitting them comprising a submerged electric

transmitter, means for focusing sound-vibrations thereon, and a receiver electrically connected with the transmitter.

3. In a submarine telephonic system, means for imparting to the water at a point below its surface the vibrations of articulate speech, and a means for taking such vibrations from the water, the same comprising a submerged, electric transmitter of the character specified, and a receiver in electric connection therewith.

4. In a submarine telephonic system, means for imparting to the water at a point below its surface the vibrations of sounds emitted without, and means for taking such vibrations from the water at a distance.

ARTHUR J. MUNDY.

Witnesses:

F. F. RAYMOND, 2d,
J. M. DOLAN.



No. 768,728.

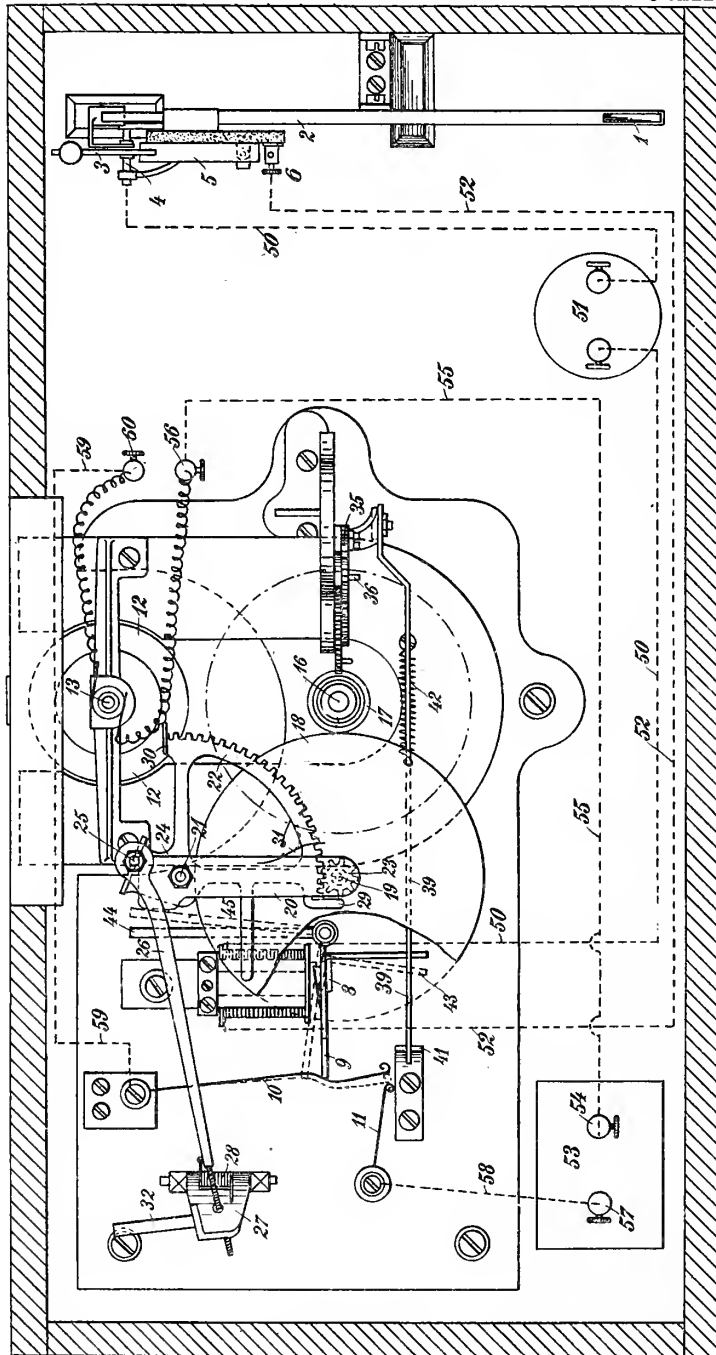
PATENTED AUG. 30, 1904.

T. BIRNBAUM.
ELECTRICALLY ACTUATED GRAMOPHONE.
APPLICATION FILED MAY 6, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

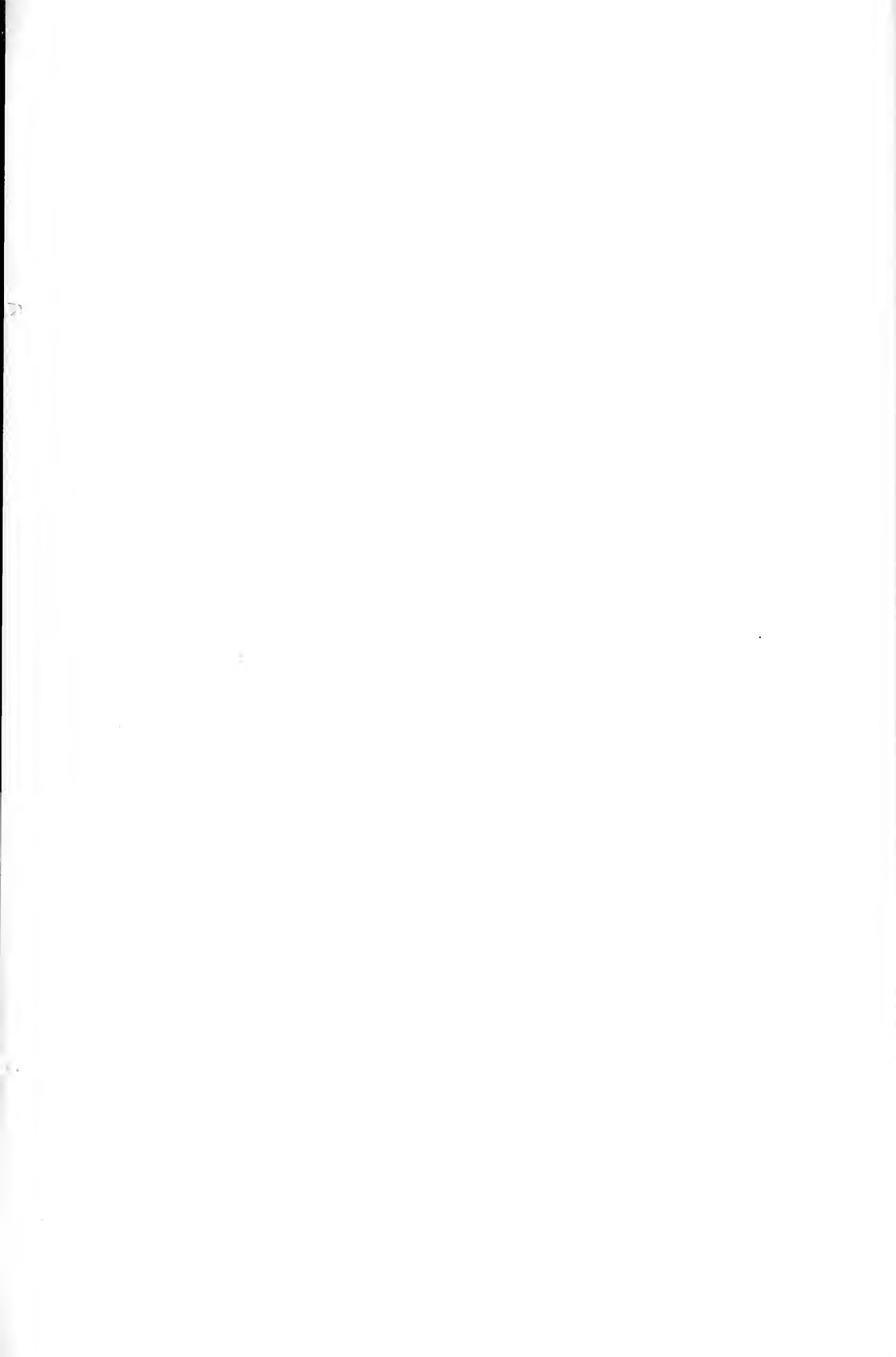
Fig. 1.



Witnesses
Thos. Howe
Arthur S. Bryant

by

Inventor
Theodore Birnbaum
Foster & Herman
Attys



No. 768,728.

PATENTED AUG. 30, 1904.

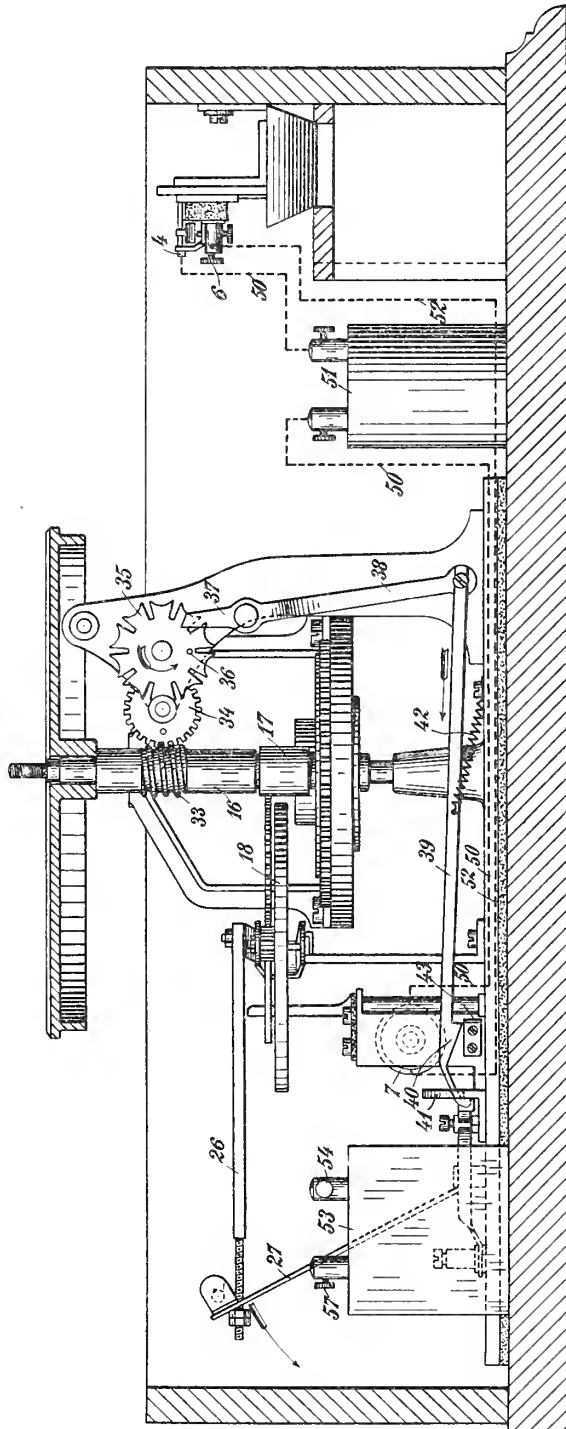
T. BIRNBAUM.
ELECTRICALLY ACTUATED GRAMOPHONE.

APPLICATION FILED MAY 5, 1902.

NO MODEL.

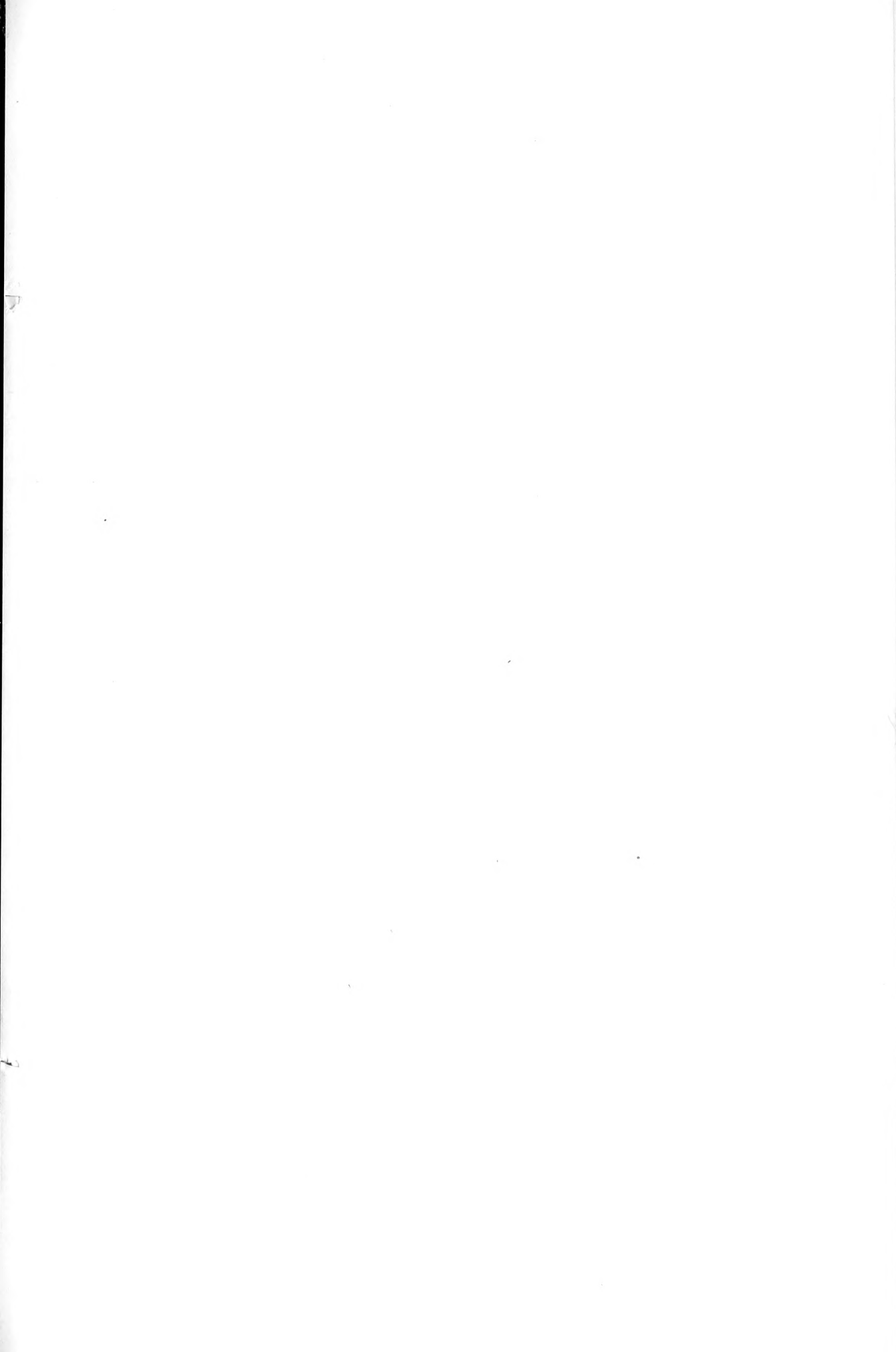
3 SHEETS—SHEET 2.

Fig. 2.



Witnesses
Thos. Howe.
Arthur L. Bayard

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Theodore Birnbaum
by
Foster & Herman
Attys



T. BIRNBAUM.
ELECTRICALLY ACTUATED GRAMOPHONE.

APPLICATION FILED MAY 5, 1902.

NO MODEL.

3 SHEETS—SHEET 3.

Fig. 3.

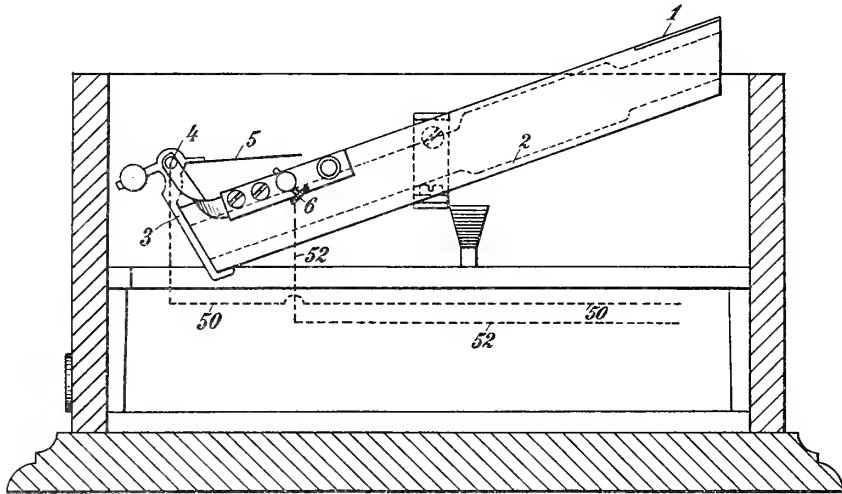


Fig. 4.

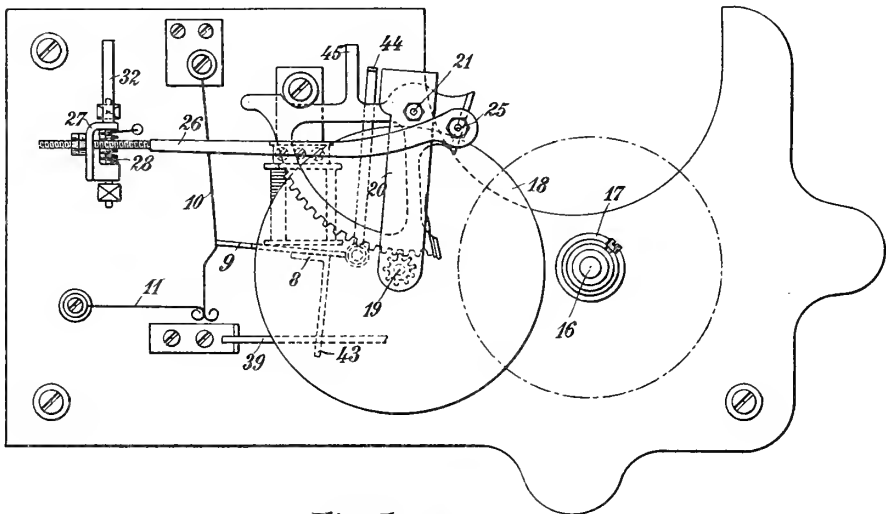
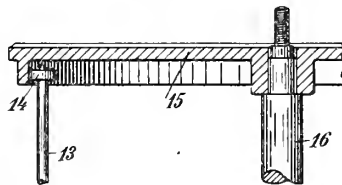


Fig. 5.



Witnesses
 Thos. Howe
 Arthur L. Bryant

Inventor
 Theodore Birnbaum
 by Foster & Furman
 Attys.

UNITED STATES PATENT OFFICE.

THEODORE BIRNBAUM, OF BERLIN, GERMANY.

ELECTRICALLY-ACTUATED GRAMOPHONE.

SPECIFICATION forming part of Letters Patent No. 768,728, dated August 30, 1904.

Application filed May 5, 1902. Serial No. 106,039. (No model.)

To all whom it may concern:

Be it known that I, THEODORE BIRNBAUM, managing director, a subject of the King of Great Britain and Ireland, at present residing at Ritterstrasse 36, in the city of Berlin, in the German Empire, have invented certain new and useful Improvements in Electrically-Actuated Gramophones, of which the following is a specification.

The invention is shown on the accompanying drawings.

Figure 1 is a plan view with the cover removed. Fig. 2 is a side elevation of the apparatus, the containing-box being sectioned to show the interior. Fig. 3 is an end view of the apparatus, the containing-box being shown in section, showing the coin-actuated mechanism. Fig. 4 is a plan view of a portion of the apparatus, showing the parts in different relative positions from those shown in Fig. 1; and Fig. 5 is a vertical section of a part of the gramophone-disk, showing the relation of the disk to adjacent parts.

The apparatus is so constructed that the insertion of a coin operates to close an independent electric circuit for exciting an electromagnet, the armature of the electromagnet actuating an electric motor for the operation of the apparatus and keeping the electric motor in operation even after the electromagnet has lost its magnetism by the disengagement of the coin and of the circuit-closing contact of the starting-electromagnet, while at the ceasing of the operation of the apparatus connected to the coin-freed delivery mechanism—that is to say, after the reproduction of the piece of music or the like corresponding to the impressions of the sound-plate—the apparatus is stopped automatically, so as to be ready for a new operation by the insertion of another coin.

The cover of the casing is provided with a slot 1, through which the coin is dropped upon the chute 2, along which it descends. At the lower extremity of the chute the coin strikes against a bent lever 3, pivoted at 4 in such a manner that the arm 5 of the bent lever, which is included in an electric circuit, contacts with the screw 6, which is also included in the circuit, thus closing said circuit.

The axis 4 of the lever 3 is connected to the line 50, which leads to the electromagnet 7 by

way of the electric battery 51. From the contact-screw 6 an electric conductor 52 also leads to the electromagnet 7. Thus if after inserting a coin into the slot 1 the arm 5 touches the screw 6 in consequence of the rotation of the lever 3 the circuit is closed by way of the conductors 50 and 52, and the electromagnet 7 thus becomes excited. By this electromagnet the armature 8 is attracted, and the extension 9 of this armature presses the spring 10 against the spring 11, and thus closes a second circuit for actuating the electromotor 12. The vertical shaft 13 of the electromotor is provided at its upper extremity with the friction-disk 14, operating to rotate the gramophone turning disk 15, which is keyed to the shaft 16. The current for the second circuit is furnished by the battery 53. One terminal, 54, of this battery is connected to the contact-screw 56 of the motor 12 by means of the conductor 55. The other terminal, 57, of the battery 53 is connected to spring 11 by means of the conductor 58, while the spring 10 is connected to the second contact-screw 60 of the motor 12 by means of a conductor 59. Hence if, as above explained, the spring 10 is forced against the spring 11 the circuit of the battery 53 is closed and the electromotor is actuated. If the spring 10 is withdrawn into the initial position from the position shown in dotted lines in consequence of the retracting of the armature 8 from the electromagnet 7, the circuit is interrupted between 10 and 11 and the motor is stopped.

In the accompanying drawings the upper gramophone turning-plate 15 is not shown in Fig. 1 for the sake of clearness of illustration. The electromagnet 7 is excited only for the short time during which the contact of the arm 5 and screw 6, Fig. 3, is effected. As soon as the armature is attracted and the spring 10 has been forced sidewise, so as to assume the position shown in dotted lines, the armature, with its extension 9, remains in the dotted position under the influence of the spring 10—that is to say, in the position corresponding to the attraction of the magnet, though the exciting of the said electromagnet 7 has ceased.

At the lower extremity of the shaft 16 of the gramophone turning disk a friction-ring

17 is mounted, which makes contact with a laterally-arranged friction-disk 18, which is rotatable on the shaft 19, rotatably journaled on an arm 20, which in its turn is arranged rotatably about the shaft 21 in the frame of the apparatus.

On the shaft 21 is rotatably mounted a toothed segment 22, engaging with the toothed wheel 23 upon the shaft 19. The toothed segment 22 is provided with an arm 24, extending beyond the rotating center 21 and to which a rod 26 is linked at 25, the free end of which is connected to a lever 27, rotatably mounted upon the bed-plate of the apparatus, the said lever being acted upon by a spring 28, which tends to turn the lever 27. By pushing the rod 26 forward or backward, respectively, the lever 27 and any parts positively connected thereto may be turned downward and lowered. The upper end of the said lever 27 is rotatably connected to a staple or yoke of substantially rectangular shape and to which the free extremity of the rod 26 is suitably and rotatably secured. In the free ends of the staple a rod is journaled on which a spring 28 is wound, one end of which is secured to the framing of the apparatus, while the other end is attached to the staple. By this means the staple on the reciprocation of the rod 26 will be rocked or tilted, and the lever 27 will thereby be free to be rocked or swung downward in its turn.

The toothed segment 22 is provided at one end with a stop 29 and with a stop 30 at the other end, the stops serving to limit the rotation of the segment, the stop 29 impinging against the toothed wheel 23 in one position, as shown in Fig. 1, while in the other position, (shown in Fig. 4.) where the friction-disks are not in engagement with each other, the stop 30 strikes against the spring 31, attached to the arm 20, as shown in Fig. 4. The action of the spring 28 upon the end of the rod 26 operates in the normal or starting position to keep the friction-disks 17 18 in engagement with each other by exerting a pull on the projection 25, which in the normal position, in which the stop 29 impinges against the free extremity of the lever, is rigidly connected with the lever 27, which causes the arm 20, with the disk 18, to be moved in the direction of the shaft 16. In the position shown in Fig. 1 the toothed segment 21 is turned in the direction of the shaft 16. Thus the operation of the apparatus—that is to say, the rotation of the shaft 16—will also cause the rotation of the friction-disk 18 by means of the friction-ring 17. This results in the rotation of the toothed segment 22 by means of the wheel 23, which is connected to the disk 18. The arm 26, which is linked to the segment 22 at 25, is thereby moved in the reverse direction of the arrow, so that the stud 25 describes an arc about the shaft 21 until the stud 25 has been moved beyond the dead-

center. In this moment the spring 28 causes the rotation of the arm 20 upon the shaft 21, so as to disengage the friction-disk 18 from the ring 17 and to arrest the disk in its position which is shown in Fig. 4 of the drawings. The friction-disk 18 remains in this position until the apparatus is stopped. The friction-disk 18, the segment 22, and the rod 26, which are only moved at the beginning and at the ending of the operation of the apparatus, serve to lower the arm 32, with the sound-box, upon the sounding-plate—that is to say, they serve to insert the needle or stylus of the sound-box into the sound-lines by the change of the relative positions of the pivots 25 and 21 due to the rotation of the segment 22, which on the starting of the apparatus is effected by the rotation of the gramophone turning disk, while at the end of the operation of the apparatus this rotation, which results in the lifting of the sound-box, is effected by a special stop or abutment, as will be hereinafter described. I am aware that this part is old, and no special claim is made to it; but it is essential to provide means whereby the sound-box is made to move, this movement being effected, for instance, by a lateral extension 32 of the upper part of the lever 27. On the other hand, it is necessary to raise the sound-box when the apparatus is stopped, which is done by the reverse movement of the rod 26 and of the arm or projection 32, respectively.

The throwing out of operation of the apparatus after the reproduction of the piece of music contained upon the sounding-plate is effected in the following manner: The shaft 16 of the gramophone turning disk is provided with a worm 33, engaging with the worm-wheel 34. The worm-wheel 34 actuates a ratchet-wheel 35, the perimeter of which corresponds to the extent of the piece of music—that is to say, when the ratchet-wheel has made one revolution the stylus of the sound-box has got to the end of the sound-lines. The ratchet-wheel 35 is provided with a pin 36, placed in the path of the two-armed lever 37 38. The arm 38 of this lever is connected to a rod 39, which serves to throw the apparatus out of operation and is provided at its extremity with a projection 40. The end of the rod 39 is peculiarly curved downward and slides in a slot of a vertical plate 41. The spring 42 tends to pull the rod 39 in the direction of the arrow. Upon moving the rod 39 by means of the pin 36 in a direction reversely to the rotation of wheel 35 when the piece of music is finished, the pin acting upon the lever arm 37, the rod 39 will be moved in the reverse direction of the arrow as soon as the arm 36 glides off from the arm 37, so that the rear part of the rod, with its projection 40, in consequence of the peculiar bent of this rod, is lowered in the slot of the plate 41 by means of the tension of the spring 42. During this

movement the projection 40 strikes against an arm 43, which is connected to the armature 8 of the electromagnet 7. By the movement of the arm 43 the armature 8 is pulled off from the electromagnet, which has already lost its magnetism. The extension of the armature 8 enters the curve of the spring 10, thus causing the latter to return to its initial position and to break the contact with the spring 11. This results in the interruption of the current which actuates the electromotor and in the stopping of the apparatus.

Upon the rotating shaft of the armature 8 an arm 44 is provided, which, if the armature is moved away from the electromagnet on the stopping of the apparatus, strikes against the arm 45 of the segment 22, thus turning the segment 22 back somewhat and allowing the stud 25 to move beyond the dead-center. As soon as this is done the arm 26 is moved back by the action of the spring 28 into its initial position, and the friction-disk 18 and the segment 22 are moved likewise in the direction toward the shaft 16. This results in the raising of the sound-box by means of the arm 32 in the manner above described. Thus the whole apparatus is stopped and the several parts are also returned to their initial position, so that they are ready for a new operation upon the insertion of a coin.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In an electrically-actuated gramophone in combination a momentarily-closed starting-circuit and an independent working circuit, an electromagnet on said starting-circuit and an electromotor on said working circuit, spring-actuated means on the working circuit to retain the armature of the starting-electromagnet in operative position after the ceasing of the starting-circuit, a gramophone turning disk operatively connected to the working electromotor and a swinging lever, operatively connected to the sound-box and stylus and stops on the starting-magnet armature capable of engagement with the said stops on the swinging lever.

2. In an electrically-actuated gramophone the combination with an electromotor working circuit and a gramophone turning disk operated by said circuit of an independent starting-circuit and means to momentarily close said starting-circuit, an armature-lever displaced by the starting-circuit and engaging with retaining means on the working circuit, a rocking lever and sound-box-actuating means on said rocking lever capable of engagement with said armature-lever and means on said lever capable of operative engagement with the gramophone turning disk.

3. In an electrically-actuated gramophone the combination with a gramophone turning disk and a sound-box of a rocking lever, a toothed segment rotatable on the pivot of said rocking lever and an extension of said seg-

ment beyond said pivot and operatively connected to said sound-box, stops on said segment capable of engagement with said rocking lever, a momentarily-closed starting-circuit and a lever displaced by said starting-circuit and capable of engagement with said toothed segment and means on the end of said rocking lever capable of engagement with said gramophone turning disk.

4. In an electrically-actuated gramophone an electromotor working circuit and an independent starting-circuit, a sound-box, a rocking lever and a toothed segment capable of independent rotation on the same pivot, an extension of said segment yieldingly connected to the sound-box, engagement means of said segment with the rocking lever and gearing intermediate of the segment and of the gramophone turning disk.

5. In an electrically-actuated gramophone in combination a gramophone turning disk working circuit, an independent momentarily-closed starting-circuit, a two-armed lever displaced by said starting-circuit and retaining means on said working circuit to keep said lever in position after the ceasing of the starting-circuit, means capable of operative connection with said gramophone turning disk and engaging with each of the arms of said lever, substantially as described.

6. In an electrically-actuated gramophone, the combination with an electromotor working circuit and a rotating shaft operatively connected to said electromotor and a gramophone turning disk keyed to said shaft, of a spring-pressed rod operated by said shaft, a lever capable of engagement with said spring-pressed rod and means on said working circuit to yieldingly retain said lever in position.

7. In an electrically-actuated gramophone a momentarily-closed starting-circuit, an independent electromotor-operating working circuit, a lever intermediate between said circuit and means on the working circuit to retain said lever in position, an extension or projection on said lever and a spring-pressed temporarily-actuated rod engaging with said projection.

8. In an electrically-actuated gramophone, a gramophone-turning-disk-operating shaft, a sound-box and stylus, a momentarily-excited starting-electromagnet, an elbow-lever serving as an armature for said electromagnet, a working circuit and an electromotor on said working circuit operatively connected to the gramophone-turning-disk-operating shaft, contact-springs on said circuit, one of said springs engaging with said elbow-lever and retaining the same in position, a rocking lever, a friction-roller at the end of said rocking lever and a friction-roller on the gramophone-turning-disk-operating shaft, a segment on the same pivot with the rocking lever and a projection or extension on said segment and linked to the sound-box and means on said segment

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to engage with said elbow-lever, substantially as described.

9. In an electrically-actuated gramophone turning disk in combination a momentarily-closed starting-circuit and an independent working circuit, an elbow-lever displaced by said starting-circuit and spring-contacts on the working circuits in engagement with said elbow-lever, a gramophone-disk-operating shaft rotated by said working circuit, a spring-pressed rod capable of engagement with said elbow-lever, an intermediate lever linked to said spring-pressed rod, a rotating disk or ratchet-wheel geared to said shaft, and a pin on said disk or ratchet-wheel, temporarily engaging with said intermediate lever, substantially as described.

10. In an electrically-operated gramophone, a momentarily-closed starting-circuit and an independent working circuit, an elbow-lever operated by said starting-circuit and retained by said working circuit, a gramophone-disk-turning shaft operated by said working circuit, a rocking sectional gear, capable of en-

gagement with said shaft and with said elbow-lever, a rod capable of reciprocating movement, linked to said sectional gear, a swinging lever arranged in a vertical plane with relation to the base of the apparatus and a spring connection between said swinging lever and said rod and a sound-box fixed to said swinging lever.

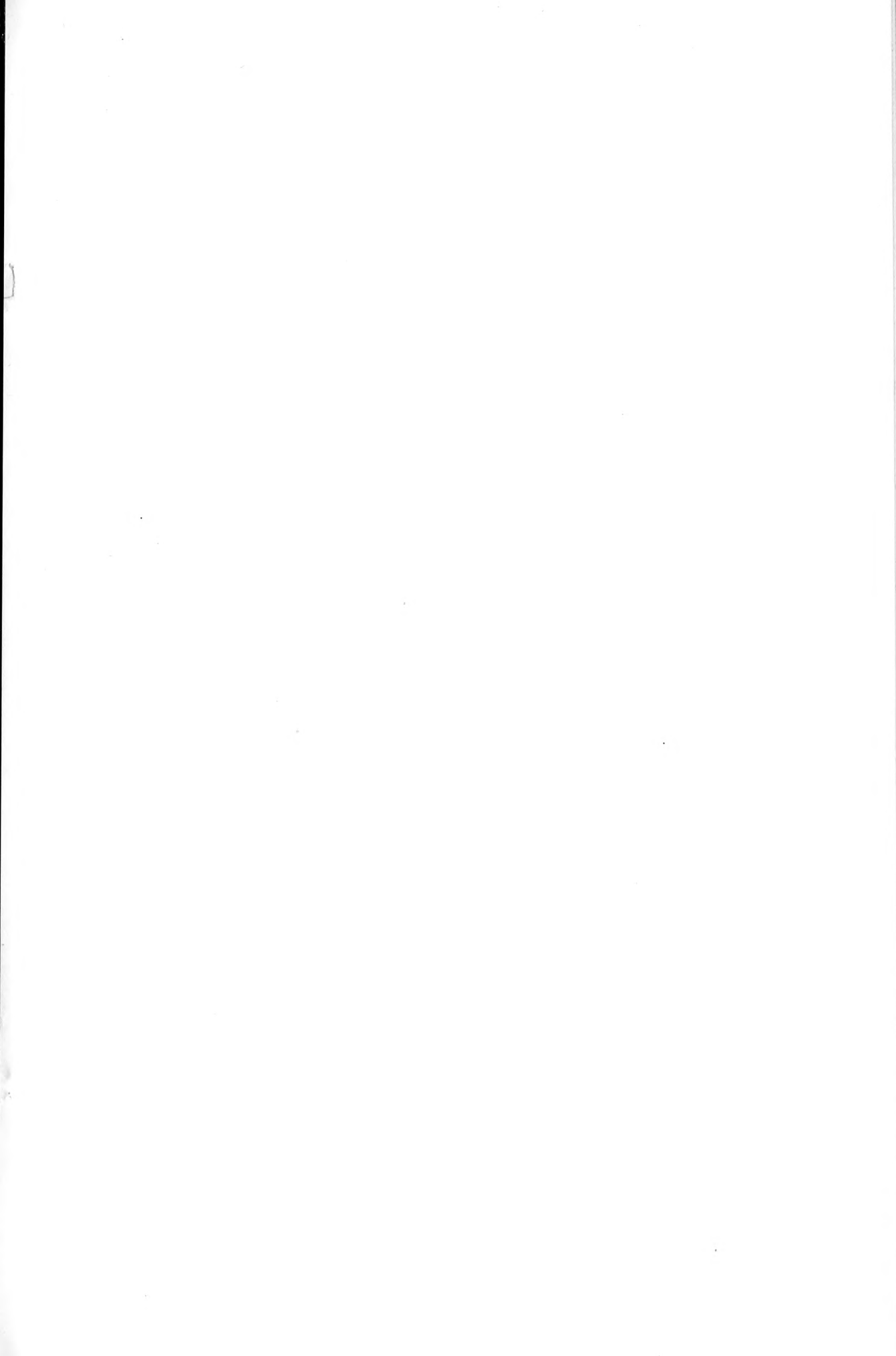
11. In an electrically-operated gramophone a gramophone turning disk, a sound-box, a tilting lever, a contact-piece in the path of said tilting lever, the contact and the lever being connected to a source of electric energy, an independent working circuit and means substantially as described on said working circuit for operating said gramophone turning disk and said sound-box.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THEODORE BIRNBAUM.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.



M. J. O'CONNOR.

SOUND CONTROLLER FOR HORNS OF PHONOGRAPHS OR GRAPHOPHONES.

APPLICATION FILED JAN. 2, 1904.

NO MODEL.

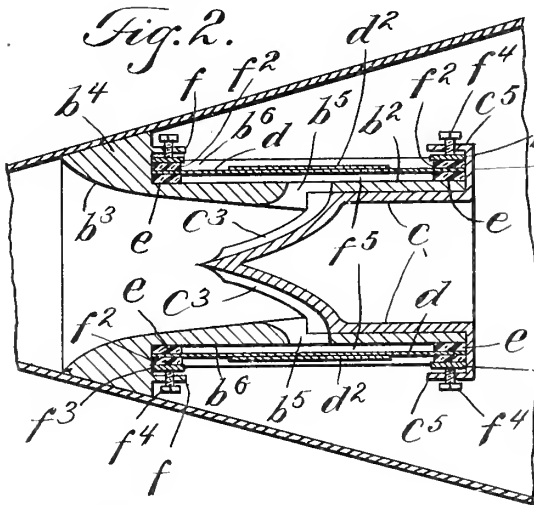
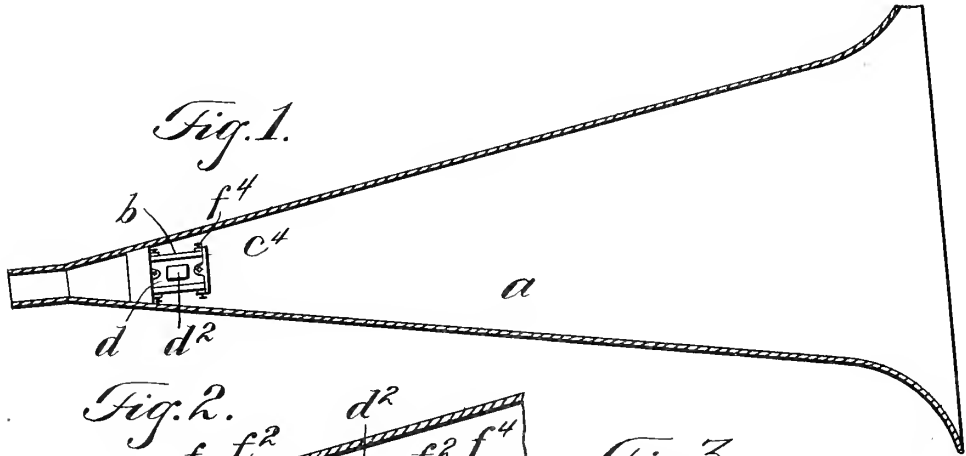


Fig. 3.

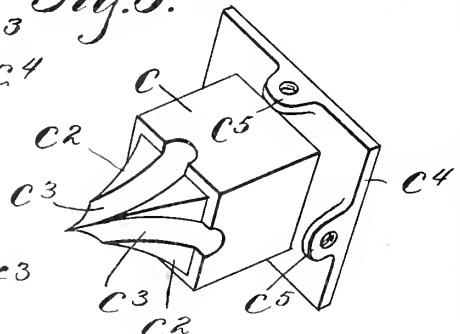


Fig. 4.

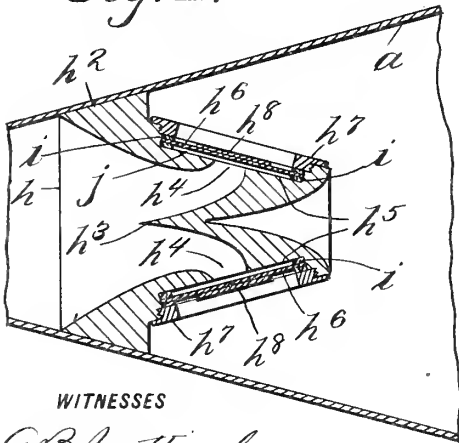
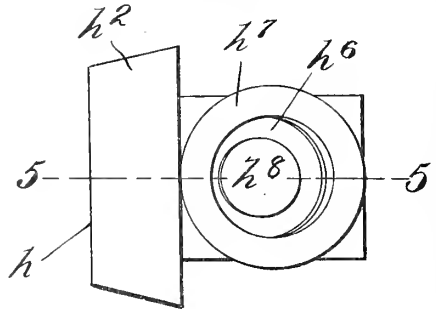


Fig. 5.



WITNESSES

A. B. Mattingly
F. A. Stewart

INVENTOR

BY *Michael J. O'Connor.*

Edgum Kate & Co.
 ATTORNEYS

ATTORNEYS

UNITED STATES PATENT OFFICE.

MICHAEL J. O'CONNOR, OF BROOKLYN, NEW YORK.

SOUND-CONTROLLER FOR HORNS OF PHONOGRAPHS OR GRAPHOPHONES.

SPECIFICATION forming part of Letters Patent No. 769,448, dated September 6, 1904.

Application filed January 2, 1904. Serial No. 187,409. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL J. O'CONNOR, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Sound-Controllers for Horns of Phonographs or Graphophones, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

The object of this invention is to provide an improved device for controlling the sound as it passes from the horn of a phonograph or similar machine, whereby the sound is made more distinct and the articulation more complete; and with this and other objects in view the invention consists in a device of the class specified constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a longitudinal section of a phonograph-horn provided with my improvement; Fig. 2, a similar view showing the improvement in section; Fig. 3, a perspective view of one part of the improvement; Fig. 4, a view similar to Fig. 2, showing a modification, said Fig. 4 being a section on the line 5 5 of Fig. 5; and Fig. 5, a side view of the improvement as shown in Fig. 4.

In the drawings forming part of this specification I have shown at *a* an ordinary phonographic horn, and in the practice of my invention I insert therein a sound controller and regulator *b*. The sound controller and regulator *b* (shown in Figs. 1, 2, and 3) comprises an oblong casing or shell *b*², the inner end of which is bell-shaped in form, as shown at *b*³, and provided with a beveled outer portion *b*¹, whereby it is made to closely fit the inner walls of the horn, near the smaller end thereof. The outer end of the casing or shell *b*² is enlarged internally, and inserted therein is a block *c*, which in the form of construction shown is hollow and conical at its

inner end, as shown at *c*². In the form of construction shown the casing or shell *b*² and the block *c* and the conical portion *c*² of said block are square or angular in cross-section, and the conical portion *c*² of said block is provided with grooves *c*³ in the sides thereof which communicate with the lateral openings *b*⁵ in the sides of the shell or casing *b*².

The outer end of the block *c* is provided with a flange or rim *c*⁴, the sides of which are provided with inwardly-directed lugs or projections *c*⁵. The casing or shell *b*² is provided in the opposite sides with a longitudinal recess *b*⁶, in each of which is placed a mica sheet *d*, the central portion of which is reinforced by a supplemental mica sheet *d*², and between the ends of the sheets *d* and the bottom of the recesses *b*⁶ in the sides of the casing or shell *b*² are placed rubber bearings *e*. The beveled portion *b*¹ of the casing or shell *b*² at the inner end thereof is also provided with outwardly-directed lugs or projections *f*, and placed on the ends of the sheets *d* are rubber bearing-strips *f*², over which are placed metal strips *f*³, and set-screws *f*⁴ are passed through the lugs or projections *c*⁵ and *f* and bear on the metal strips *f*³, which in turn bear on the rubber strips or bearings *f*², so as to securely hold the mica sheets *d* in position, and by means of this construction a space *f*⁵ is provided between the mica sheets *d* and the casing or shell *b*². In practice this device is inserted into the horn *a*, as shown in Figs. 1 and 2, and the sound escaping from the horn is controlled and regulated and the articulation is made more distinct and perfect.

Although the casing or shell *b*² and the parts *c* inserted therein are shown and described as angular in cross-section, these parts, as will be understood, may be circular in cross-section, if desired, and the inner end of the casing or shell *b*² in the form of construction shown is circular in cross-section at the inner side thereof.

In Figs. 4 and 5 I have shown a modification in which I employ a sound controller and regulator *h*, bell-shaped in form at the inner end and beveled at the outer side thereof, as

shown at h^2 , so as to closely fit the inner walls of the horn a , and the outer end thereof is conical in general form and provided with an inwardly-directed conical portion h^3 , at the sides of which are lateral openings h^4 , which communicate with recesses h^5 in the sides of the outer end of the casing or shell h , and in these recesses are placed mica sheets h^6 , held in place by collars h^7 , screwed into said recesses. In this form of construction the casing or shell h is integral or composed of one part, and the recesses h^5 in the sides thereof are circular in form, as are also the mica sheets h^6 , and said mica sheets h^6 are also reinforced by supplemental mica sheets h^8 , placed centrally of the outer side thereof. It will be observed that in both forms of construction the supplemental mica sheets d^2 , as shown in Figs. 1 and 2, and h^8 , as shown in Figs. 4 and 5, are of less dimensions than the main mica sheets d and h^6 , on which they are placed, and the vibrations of the mica sheets d and h^6 , occasioned by the sound-waves striking on the inner sides thereof, control and regulate said sound, as hereinbefore described. The mica sheets h^6 are also held in place by rubber strips or bearings i at the opposite ends thereof, between which said mica sheets are placed, and between the mica sheets h^6 and the bottoms of the recesses in which they are placed are spaces j , similar to the spaces f^5 in the form of construction shown in Fig. 2.

As thus constructed it will be seen that my improvement comprises a device adapted to be inserted into the horn of a phonograph or similar instrument for the purpose herein specified, said device comprising a main part or shell bell-shaped at its inner end and the outer end of which is provided with a supplemental member having a conical inner end, the main part or shell being provided in the sides thereof with lateral openings adjacent to the base of the conical inner end of the supplemental part and which communicate with recesses in the outer side walls of the main part or shell, in which are placed mica plates or disks, between which and the main part or shell are spaces adapted to receive sound-waves passing outwardly through said openings, and it will be apparent that various changes in and modifications of the construction herein described may be made without departing from the spirit of my invention or sacrificing its advantages.

Although I have described the sheets or disks d and h^6 as composed of mica, it will be understood that these disks or sheets are vibratory in character and may be composed of any material which will accomplish the desired results, and my invention is not limited to the use of the supplemental sheets or disks d^2 and h^8 , as in some cases the sheets or disks d and h^6 may be found to operate satisfactorily without said supplemental sheets or disks.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A sound controller and regulator adapted to be inserted into the horn of a phonograph or similar instrument, and comprising a main part or casing bell-shaped in form at its inner end and provided at its outer end with an inwardly-directed conical member at the sides of which are lateral openings which communicate with recesses or chambers formed in the sides of the outer shell or member, and vibratory sheets or disks secured in said recesses or chambers, substantially as shown and described.

2. A sound controller and regulator adapted to be inserted into the horn of a phonograph or similar instrument, and comprising a main part or casing bell-shaped in form at its inner end and provided at its outer end with an inwardly-directed conical member at the base of which are lateral openings which communicate with chambers or recesses in the sides of the main part or casing, and vibratory sheets or disks placed in said recesses or chambers, said sheets or disks being supported between rubber or similar bearings, substantially as shown and described.

3. A sound controller and regulator adapted to be inserted into the horn of a phonograph or similar instrument, and comprising a main part or casing bell-shaped in form at its inner end, a supplemental part inserted into the outer end thereof and cone-shaped in form at its inner end, the cone-shaped part being provided with side grooves which communicate with openings in the sides of the main part or casing, said sides of the main part or casing being also provided with chambers or recesses with which said openings communicate, and vibratory sheets or disks secured in said chambers or recesses, substantially as shown and described.

4. A sound controller and regulator adapted to be inserted into the horn of a phonograph or similar instrument, and comprising a main part or casing bell-shaped in form at its inner end, a supplemental part inserted into the outer end thereof and cone-shaped in form at its inner end, the cone-shaped part being provided with side grooves which communicate with openings in the sides of the main part or casing, said sides of the main part or casing being also provided with chambers or recesses with which said openings communicate, and vibratory sheets or disks secured in said chambers or recesses, and provided with reinforcing sheets or disks arranged centrally thereof, substantially as shown and described.

5. A sound controller and regulator adapted to be inserted into the horn of a phonograph or similar instrument and closed at its outer end, the inner end of said controller or regulator being open and the sides thereof

vided with openings, the outer sides of the controller and regulator being provided with chambers or recesses with which said openings communicate and vibratory devices secured in said chambers or recesses, substantially as shown and described.

In testimony that I claim the foregoing as

my invention I have signed my name, in presence of the subscribing witnesses, this 31st day of December, 1903.

MICHAEL J. O'CONNOR.

Witnesses:

F. A. STEWART,

C. E. MULREANY.



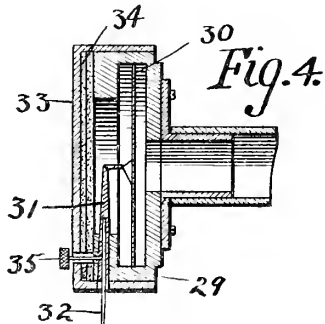
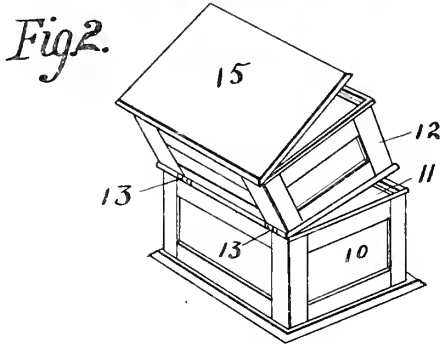
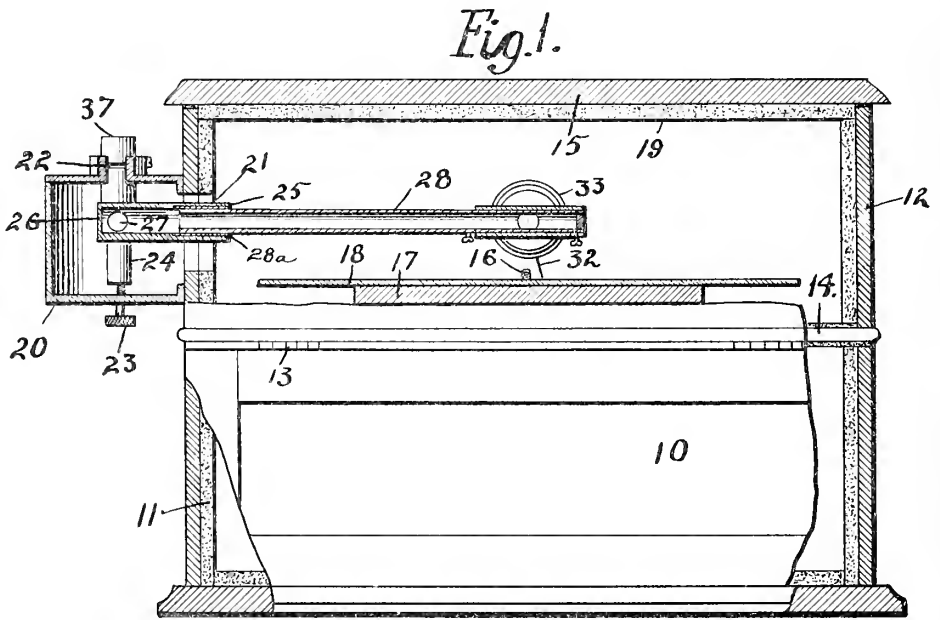
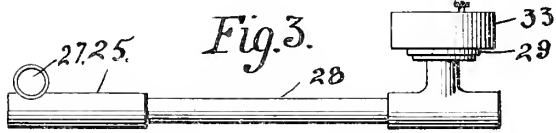
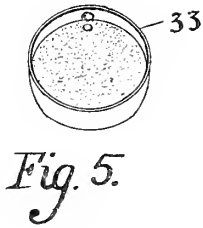
No. 769,696.

PATENTED SEPT. 13, 1904.

H. W. JOHNSON.
TALKING MACHINE.

APPLICATION FILED MAY 4, 1903.

NO MODEL.



Witnesses
 A. S. Haquet.
 K. K. Keffler.

Inventor H. W. Johnson.
 By *Oring & Lane* Att'ys

UNITED STATES PATENT OFFICE.

HOMER W. JOHNSON, OF CHARLES CITY, IOWA.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 769,696, dated September 13, 1904.

Application filed May 4, 1903. Serial No. 155,559. (No model.)

To all whom it may concern:

Be it known that I, HOMER W. JOHNSON, a citizen of the United States, residing at Charles City, in the county of Floyd and State of Iowa, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

It is my object to provide a device for use in connection with any of the ordinary talking-machines which when properly arranged will provide a muffler for the screeching and shrill sounds which ordinarily accompany any of the phonographs, gramophones, and talking-machines when in operation.

As the diaphragm of the machine vibrates some sound is reproduced on both sides of the diaphragm, and inasmuch as it is desirable to have the sound come from only the horn side of the diaphragm, for the reason that the noise on the other side of the diaphragm is unnecessary in producing good results, it is my object to provide a muffler for the side of the diaphragm away from the horn to cut off the sound from that side and also eliminate to a large extent the rasping sound which is created by the needle as it passes over the record.

It is my object, further, to not only muffle this side of the diaphragm, but to also muffle the entire mechanism of the machine, so that a minimum amount of sound will be emitted from it when the device is in operation excepting through the horn.

It is my object, further, to provide a reproducer-arm for the machine which can be easily operated on the interior of the box and which will also swing readily, so that the needle in said arm may move freely over the surface of the record, and, further, to provide in this reproducer-arm a muffled connecting-joint to eliminate the sounds which are usually occasioned by the ordinary machine when in operation, owing to the methods usually employed in connecting the reproducer with the horn. This is accomplished by means of a non-metallic connection in my machine between the reproducer and the horn.

It is to be understood that my muffler may be used on machines having a cylinder record or disk record, and my muffler may be used on any type of machine now upon the market.

My invention consists in certain details in the construction, arrangement, and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a vertical sectional view of the upper portion of the talking-machine and a portion of the sides of the lower portion of my machine broken away to show that the muffler extends throughout the entire case containing the ordinary mechanism of a talking-machine. Fig. 2 is a perspective view of the complete case, showing the way in which the upper and lower portions are hinged together and the cover hinged to the upper portion. Fig. 3 is a plan view of the reproducer-arm with a portion broken away to show the non-metallic connection in the reproducer-arm. Fig. 4 is a detail sectional view of the inner end of the reproducer-arm, showing the diaphragm and the needle in position relative to the diaphragm and the muffler-cap which I have provided for the diaphragm-casing.

Referring to the accompanying drawings, I have used the reference-numeral 10 to indicate the lower portion of the muffler-case, which is designed to incase the mechanism for driving my machine. This mechanism is of the ordinary construction, and a description of it is deemed unnecessary, as any suitable mechanism which will rotate the record at a uniform speed may be used. The interior of this portion of the muffler-case has a lining of sound-proof material 11. Hinged to the upper portion of box 10 is the upper portion 12, corresponding very nearly in size to the lower portion 10. This upper portion is held in position relative to the lower portion by means of the hinges 13, and they are so arranged that the upper and lower portions can be swung on these hinges away from each other at their forward portion. In the chamber below the part 14 of the muffler-case the usual motor is intended to be mounted for operating the turn-table which carries the record.

Attached to the upper portion 12 of the muffler-case is the cover 15, which is also

hinged to the upper portion 12, so that easy access may be had to the upper portion 12 for the purpose of changing records and needles. Extending through the lower portion 5 14 of the upper portion 12 is the shaft 16, said shaft being rotated by the driving mechanism of the machine. Mounted on this shaft 16 is the turn-table 17, which rotates as the shaft 16 is rotated. Mounted on top of this turn- 10 table 17 is the record 18, said record being detachably mounted on the shaft 16 in the ordinary way.

The entire interior of the upper portion 12 of the muffler-case, including the cover 15, is 15 provided with a lining 19, said lining being of some sound-proof material and is designed to eliminate non-musical sounds produced by the operation of the machine. To the upper portion 12 of the muffler-case and at one side 20 of it I have mounted a boxing 20. This boxing is hollow, and there is an opening leading from the interior of this boxing 20 to the interior of the upper portion 12 of the muffler-case. Mounted loosely in the opening 22 is a 25 tube 24, which is held in a vertical position in the boxing 20 by means of the set-screw 23. The upper portion of the tube is designed to allow the sound to pass through it. Firmly attached to the tube 24 and leading inwardly 30 therefrom through the opening 21 is the hollow arm 25. The outer end of the arm 25 has the end piece 26 therein, designed to prevent sound from being transmitted in the direction of said end piece. The opening 27 35 leads from the tube 24 into the arm 25. Slidingly mounted in the arm 25 is the tube 28, which forms an extension of the arm 25, and the arm 25 and tube 28 form a reproducer-arm. A packing 28^a is mounted between the 40 outer portion of the tube 28 and the inner portion of the arm 25 and is designed to make a sound-proof joint between said parts. Rotatably mounted on the inner end of the tube 28 is the reproducer 29, having a head thereon containing the diaphragm 30 and the needle- 45 holder 31, which is connected to the diaphragm by wax. Mounted on the lower end of the needle-holder is the needle 32. Mounted around said head, which forms the portion of 50 the reproducer, is a sound-box 33, having the sound-proof lining 34 on its interior. This sound-box is mounted as is clearly shown in Fig. 4 of the drawings. I have provided a thumb-screw 35 to maintain the needle 32 in 55 position relative to the needle-holder 31 and also serve the purpose of preventing the sound-box 33 from slipping off the head of the reproducer 39. The sound-box 33 is for the purpose of muffling the sound on one side of 60 the reproducer-diaphragm. I have provided a collar 37, which is designed to be mounted in the opening 22, upon which the amplifying-horn is to be mounted. Thus it will be seen that there is a hollow tube leading from 65 the reproducer-diaphragm to the amplifying-

horn, and as all of the parts are muffled all sounds aside from those which come from the amplifying-horn will be eliminated to a great extent.

The reproducer-muffler here shown and de- 70 scribed is in the form of a stamped metal casing filled with sound-proof material and attached to the body of the reproducer with machine-screws. It is distinctly understood in this connection, however, that I do not re- 75 strict myself to this particular form of reproducer-muffler. Any material or combination of materials which may be attached to the open side of a reproducer either as an attach- 80 ment or in the manufacture of such reproducer for the purpose of eliminating the sounds emitted by the side of the reproducer-diaphragm opposite the horn connection may be used in my reproducer-muffler. I have 85 used felt in all my mufflers as a sound-proof agent, because it is easily obtained in any size and thickness desired, is easily manipulated, inexpensive, and very effective. Any material, as mineral wool, asbestos, or other sound-proofing materials, may be used in my 90 device.

My mufflers are designed to be used with all types of phonographs, graphophones, gram- 95 phones, or similar machines, commonly called "talking-machines."

My device is subject to many modifications and changes in the manufacture of it, which do not affect in any way the mechanism, for it may be necessary to adapt it to different 100 styles of machines, and for that reason a number of changes in the construction may be made without altering the main features of my construction.

Having thus described my invention, what I claim, and desire to secure by Letters Pat- 105 ent of the United States therefor, is—

1. In a device of the class described, the combination of a two-part reproducer-arm, one of said parts being capable of sliding movement relative to the other, a sound-proof material 110 mounted between the stationary and the sliding parts of said arm, a reproducer, a sound-box having a sound-proof material on its interior designed to be mounted on said repro- 115 ducer, and a two-part sound-proof box designed to be mounted outside of the reproducer, for the purposes stated.

2. In a device of the class described, the combination of a two-part sound-proof box, the upper part of said box having an opening lead- 120 ing through one side of it, a boxing mounted outside of said opening and attached to the upper portion of the box, a rotatably-mounted tube in said boxing, a hollow reproducer-arm attached to said tube, having an opening lead- 125 ing from its interior to the interior of said tube, a reproducer at the inner end of said arm and on the interior of said box, a sound-box with a sound-proof lining mounted on said repro- 130 ducer, for the purposes stated.

3. In a device of the class described, the combination of a two-part sound-proof box, the upper part of said box having an opening leading from its interior to its exterior, a boxing 5 attached to the upper part of said box and outside of said opening, a tube rotatably and detachably mounted in said boxing, the upper portion of said tube leading into an opening in the upper portion of said casing, a hollow 10 reproducer-arm firmly attached to and communicating with said tube and extending through the opening in the upper part of the box, for the purposes stated.

4. In a device of the class described, the combination of a two-part sound-proof box, the upper part of said box having an opening leading from its interior to its exterior, a boxing 15 attached to the upper part of said box and outside of said opening, a tube rotatably and detachably mounted in said boxing, the upper portion of said tube leading into an opening in the upper portion of said casing, a hollow 20 two-part reproducer-arm firmly attached to said tube and communicating therewith, a reproducer rotatably mounted at the inner end 25 of said reproducer-arm, the inner end of said reproducer being capable of sliding movement

relative to the outer part of said arm, a sound-proof packing between the parts of said arm, for the purposes stated. 30

5. In a device of the class described, the combination of a two-part sound-proof box, the upper part of said box having an opening leading from its interior to its exterior, a boxing 35 attached to the upper part of said box and outside of said opening, a tube rotatably and detachably mounted in said boxing, the upper portion of said tube leading into an opening in the upper portion of said casing, a hollow 40 two-part reproducer-arm firmly attached to said tube and communicating therewith, a reproducer rotatably mounted at the inner end of said reproducer-arm, the inner end of said 45 reproducer being capable of sliding movement relative to the outer part of said arm, a sound-proof packing between the parts of said arm, and a sound-proof boxing having a sound-proof lining therein detachably mounted outside of said reproducer, for the purposes stated.

HOMER W. JOHNSON.

Witnesses:

J. A. CASE,

R. V. McCAMMOND.



No. 770,024.

PATENTED SEPT. 13, 1904.

B. RUGGIERO & G. BONGIORNO.
HORN FOR PHONOGRAPHS OR SIMILAR MACHINES.

APPLICATION FILED JUNE 24, 1904.

NO MODEL.

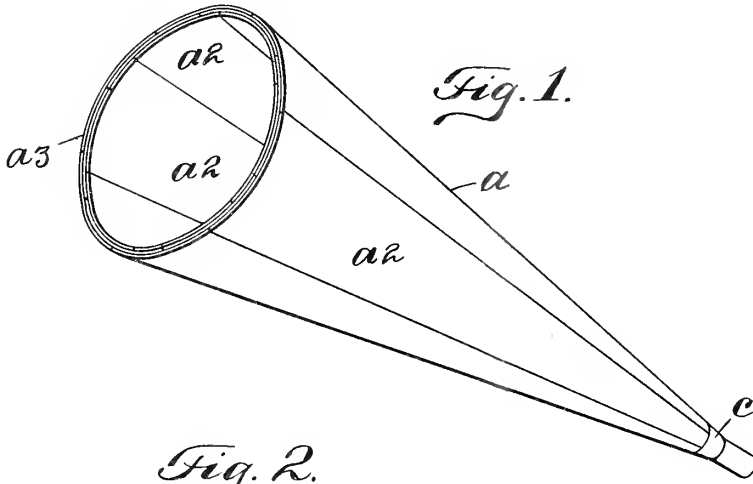


Fig. 2.

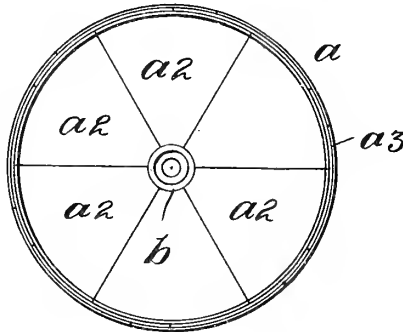
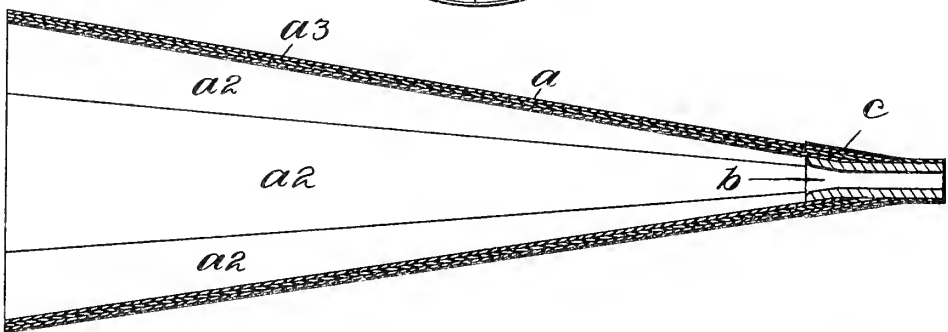


Fig. 3.



WITNESSES

A. B. Mattingly
C. E. Oulreany

INVENTORS

Bartolo Ruggiero
Gaetano Bongiorno

Edgar S. Tate & Co.

BY

ATTORNEYS

UNITED STATES PATENT OFFICE.

BARTOLO RUGGIERO AND GAETANO BONGIORNO, OF BROOKLYN,
NEW YORK.

HORN FOR PHONOGRAPHS OR SIMILAR MACHINES.

SPECIFICATION forming part of Letters Patent No. 770,024, dated September 13, 1904.

Application filed June 24, 1904. Serial No. 213,916. (No model.)

To all whom it may concern:

Be it known that we, BARTOLO RUGGIERO, a citizen of the United States, and GAETANO BONGIORNO, a subject of the King of Italy, both residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Horns for Phonographic or Similar Machines, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to horns for phonographic and similar machines; and the object thereof is to provide a horn for machines of this class which will do away with the mechanical, vibratory, and metallic sound usually produced in the operation of such machines and also produce a full, even, and continuous volume of sound, in which the articulation will be clear, full, and distinct.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of our improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a perspective view of our improved phonographic horn; Fig. 2, an end view thereof, and Fig. 3 a longitudinal section.

In the practice of our invention we provide a horn *a*, composed of separate layers of longitudinally-arranged strips *a*², said strips being preferably composed of wood or similar fibrous material. In the construction shown three of the separate layers are employed, as shown at *a*³, and each of said layers is composed of six of the separate and longitudinally-arranged strips *a*². The separate layers *a*³, which make up the horn *a*, may be secured together at the edges by glue or in any suitable way, and in practice said layers are preferably formed separately and inserted into each other, or the outer layer is first formed and the second and third layers inserted thereinto, and in this operation the outer surface of the second and third layers are covered with any suitable glue or adhesive material, and the

separate parts or layers of the horn are thus securely held together and make up, in effect, a single homogeneous construction. Instead of forming the separate layers separately and inserting one within another, as hereinbefore described, the inner layer may first be formed and the separate longitudinal strips of the second layer secured thereon, after which the separate longitudinal strips of the outer layer may be secured in position, and in either event the separate layers are so connected as to break the joints thereof, as clearly shown in Figs. 1 and 2.

In the smaller end of the horn *a* is secured a short tube *b*, which is larger at its outer than its inner end, and this tube is also composed of wood or similar fibrous material and is intended to strengthen the smaller end of the horn, and in practice I secure on the smaller end of the horn a sleeve *c*, which is preferably composed of metal and which is also intended to give strength to the smaller end of the horn and facilitate the attachment of the horn to the machine without injury to the smaller end of the horn.

It will be understood that the general form of the horn may be the same as other devices of this class, and the larger end thereof may be bell-shaped, if desired, and the connections of the horn with the machine is made in the usual manner.

By means of our improvement we provide a horn for the purpose specified which will produce a constant and continuous volume of sound, in which the articulation will be clear, full, and distinct and which will not produce the mechanical, vibratory, and metallic sound usually produced by instruments of this class as heretofore constructed.

Our invention is not limited to the exact form of the horn, nor to the number of the separate layers of material employed in the construction thereof, nor to the number of longitudinal strips in each layer, and various changes in and modifications of the construction herein described may be made without departing from the spirit of our invention or sacrificing its advantages.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

5 1. A horn for phonographic and similar machines, composed of separate layers of fibrous material, each of said layers being composed of separate longitudinal strips arranged so as to break joints, substantially as shown and described.

10 2. A horn for phonographic and similar machines, composed of separate layers of fibrous material, each of said layers being composed of separate longitudinal strips arranged so as

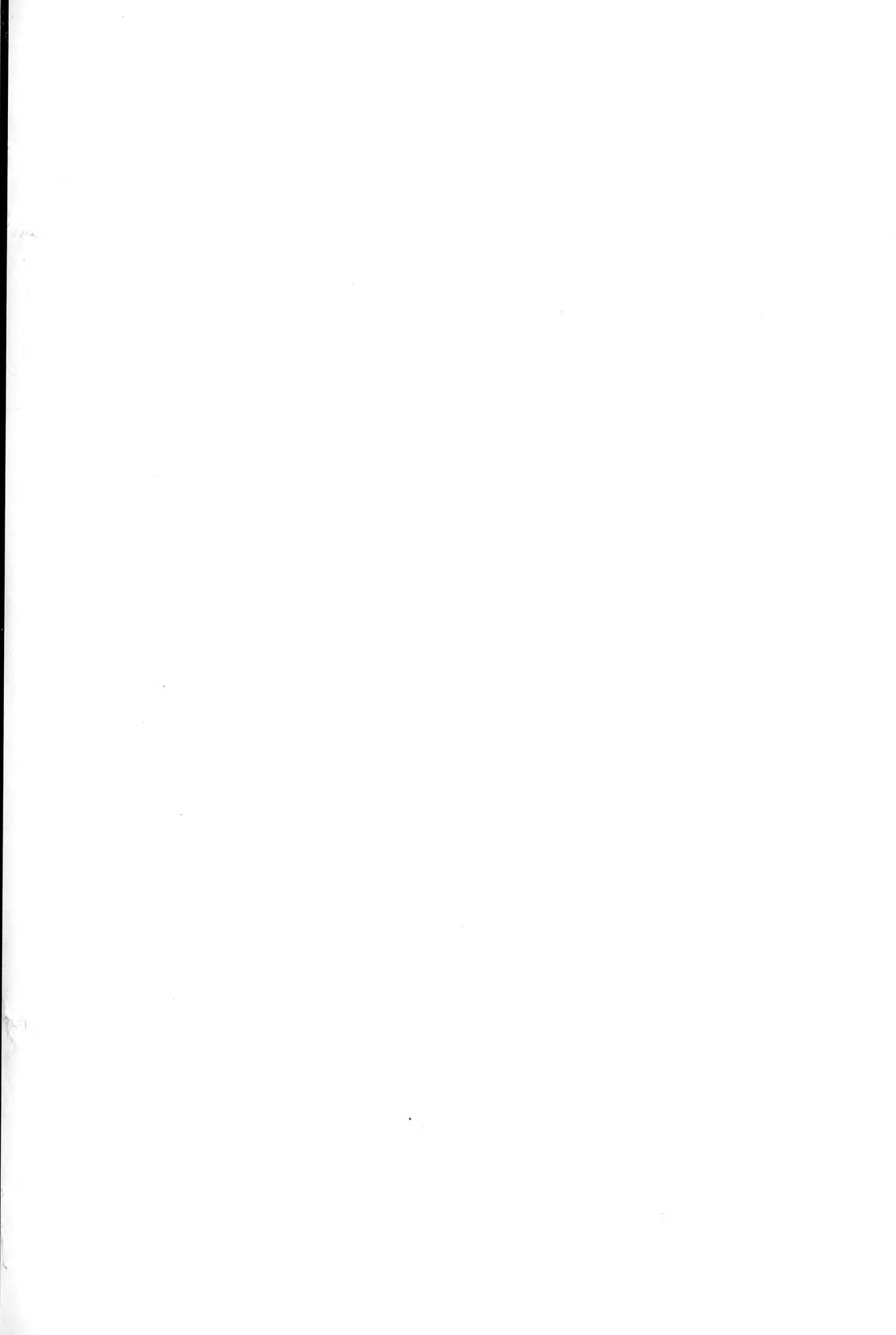
to break joints, and the smaller end of the horn being provided with a tube of fibrous material which is secured therein, substantially as shown and described. 15

In testimony that we claim the foregoing as our invention we have signed our names, in presence of the subscribing witnesses, this 22d 20 day of June, 1904.

BARTOLO RUGGIERO.
GAETANO BONGIORNO.

Witnesses:

C. J. KLEIN,
C. E. MULREANY.



P. C. NIELSEN.
HORN FOR PHONOGRAPHS OR SIMILAR MACHINES.
APPLICATION FILED APR. 14, 1904.

NO MODEL.

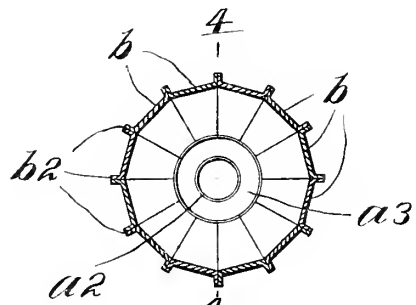
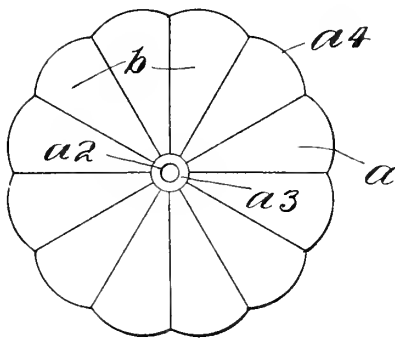
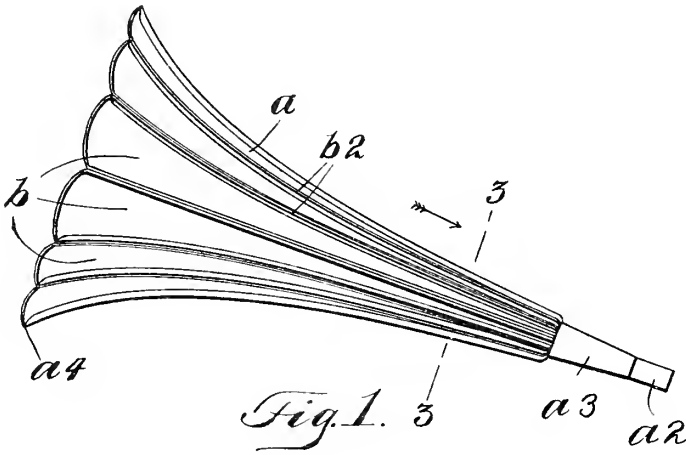


Fig. 2.

Fig. 3.

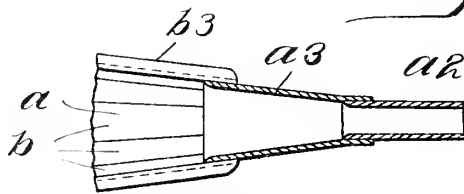


Fig. 4.

WITNESSES
Al. Mattingly
F. A. Stewart

INVENTOR
 Peter C. Nielsen,
 BY *Edgar Tate & Co.*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

PETER C. NIELSEN, OF GREENPOINT, NEW YORK.

HORN FOR PHONOGRAPHS OR SIMILAR MACHINES.

SPECIFICATION forming part of Letters Patent No. 771,441, dated October 4, 1904.

Application filed April 14, 1904. Serial No. 203,080. (No model.)

To all whom it may concern:

Be it known that I, PETER C. NIELSEN, a citizen of the United States, residing at Greenpoint, in the county of Kings and State of New York, have invented certain new and useful Improvements in Horns for Phonographs or Similar Machines, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to the horn of a phonograph or other machine of this class; and the object thereof is to provide a horn for machines of this class which will do away with the mechanical, vibratory, and metallic sound usually produced in the operation of such machines, and also produce a full, even, and continuous volume of sound in which the articulation is clear, full, and distinct.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a side view of my improved phonograph-horn; Fig. 2, an end view thereof; Fig. 3, an enlarged section on the line 3 3 of Fig. 1, and Fig. 4 a longitudinal section on the line 4 4 of Fig. 3.

In the practice of my invention I provide a horn a , provided at its smaller end with the usual nozzle-piece a^2 , by means of which connection is made with the machine, and in the form of construction shown a supplemental piece a^3 is employed between the larger or body portion of the horn and the nozzle-piece a^2 ; but the parts a^3 and a^2 may be formed integrally, if desired, and may be constructed in any desired manner. The main part a of the horn is bell-shaped in form and tapers outwardly gradually from the part a^3 to the larger or mouth end a^1 , and this curve or taper is greater or more abrupt adjacent to said larger or mouth end. The body portion of the horn is also composed of a plurality of longitudinal strips b , which are gradually tapered from one end to the other, and which are connected longitudinally, so as to form longitudinal ribs b^2 , each of the strips b being provided at

its opposite edges with a flange b^3 , and these flanges of the separate strips b are connected to form the ribs b^2 . The body portion of the horn or the strips b are composed of sheet metal, and it will be observed that the inner wall of the body portion of said horn in cross-section is made up of a plurality of short lines forming substantially a circle, and it is the construction of the body portion of the horn as hereinbefore described that gives thereto the qualities which it is the objects of this invention to produce, which objects are the result of the formation of the horn or the body portion thereof of longitudinal strips b and providing the outer surface thereof with the longitudinal ribs b^2 and curving the body portion of the horn in the manner described. If desired, the part a^3 may be formed integrally with the body portion of the horn, in which event the ribs b^2 would extend to the nozzle or connecting portion a^2 , and it is the longitudinal ribs b^2 which contribute mostly to the successful operation of the horn, said ribs serving to do away with the vibratory character of horns of this class as usually made and doing away with the metallic sound produced in the operation thereof.

My improved horn may be used in connection with phonographs or other machines of this class, and changes in and modifications of the construction described may be made without departing from the spirit of my invention or sacrificing its advantages.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A horn for phonographs and similar machines, the body portion of which is composed of longitudinally-arranged strips of metal provided at their edges with longitudinal outwardly-directed flanges whereby said strips are connected and whereby, the body portion of the horn is provided on the outside thereof with longitudinally-arranged ribs, substantially as shown and described.

2. A horn for phonographs and similar machines, the body portion of which is composed of longitudinally-arranged strips of metal provided at their edges with longitudinal outwardly-directed flanges whereby said strips

are connected and whereby, the body portion of the horn is provided on the outside thereof with longitudinally-arranged ribs, said strips being tapered from one end of said horn to the
5 other, substantially as shown and described.

3. A horn for phonographs and similar instruments, said horn being larger at one end than at the other and tapered in the usual manner, said horn being composed of longitudinally-arranged strips secured together at
10 their edges and the outer side thereof at the

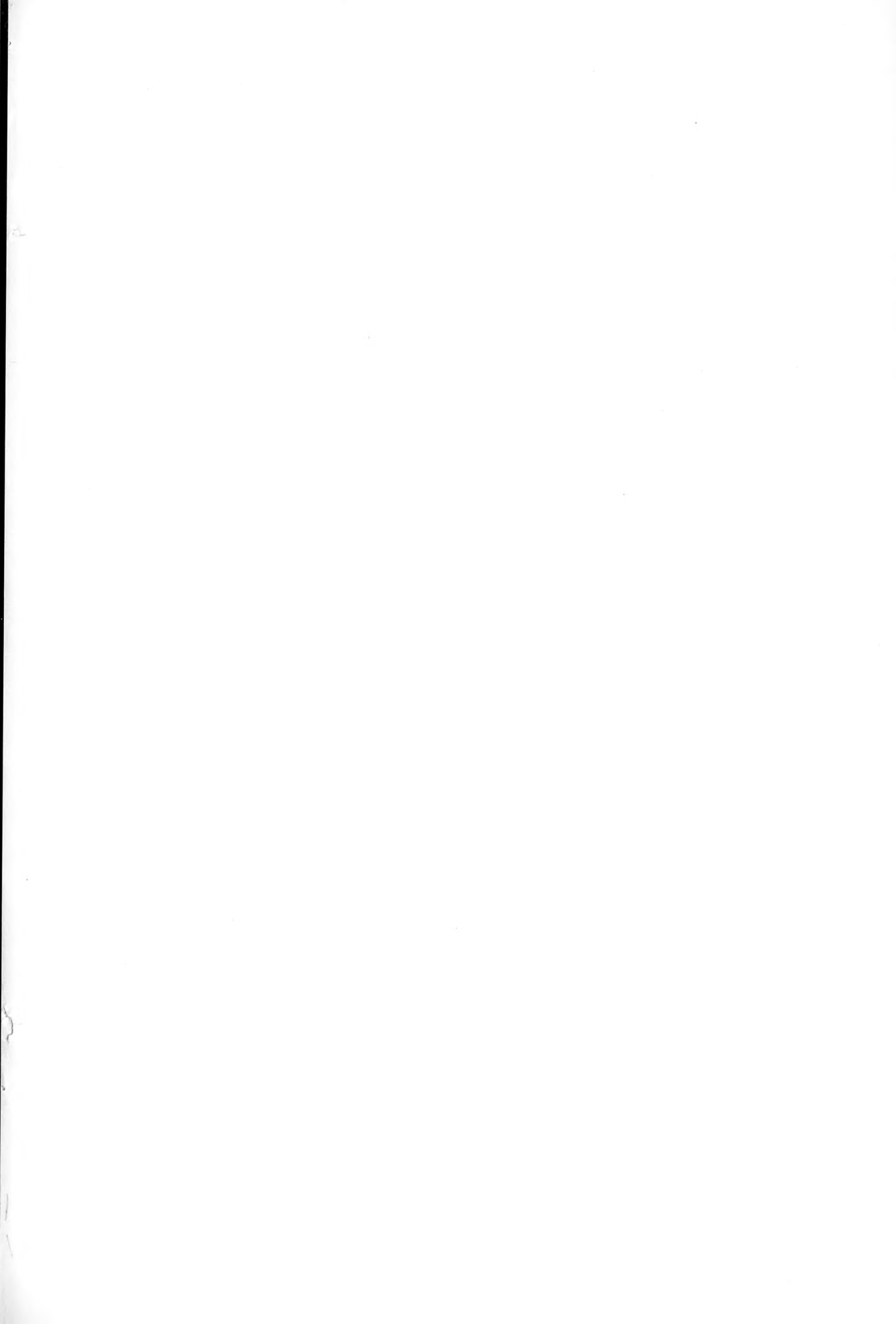
points where said strips are secured together being provided with longitudinal ribs, substantially as shown and described.

In testimony that I claim the foregoing as
my invention I have signed my name, in presence of the subscribing witnesses, this 13th
day of April, 1904.

PETER C. NIELSEN.

Witnesses:

F. A. STEWART,
C. J. KLEIN.



No. 771,564.

PATENTED OCT. 4, 1904.

J. J. NEUMANN.
PHONOGRAPH REPRODUCER.
APPLICATION FILED APR. 22, 1904.

NO MODEL.

Fig. 1.

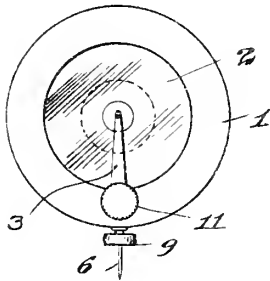


Fig. 2.

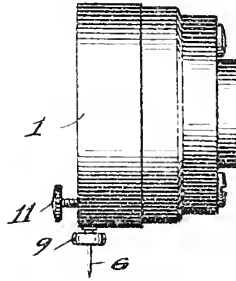
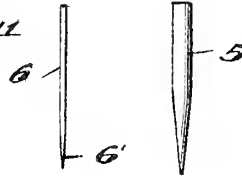
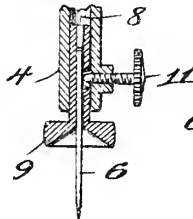
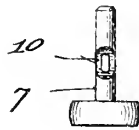


Fig. 4. Fig. 3. Fig. 5. Fig. 6.



Witnesses,
S. S. Mann,
A. S. Graves.

Inventor,
Julius J. Neumann,
By *Offield Towler & Lenthicum*
Attys

UNITED STATES PATENT OFFICE.

JULIUS J. NEUMANN, OF CHICAGO, ILLINOIS.

PHONOGRAPH-REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 771,564, dated October 4, 1904.

Application filed April 22, 1904. Serial No. 204,383. (No model.)

To all whom it may concern:

Be it known that I, JULIUS J. NEUMANN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a specification.

This invention relates to improvements in phonograph-reproducers, and refers more specifically to an improved reproducing-needle and mechanism for operatively connecting the same with the vibratory arm.

The salient object of the invention is to provide a needle which is resilient to a substantial degree and to such degree as to yield in itself when in operation, thereby producing a radically different tone when used in connection with records of the usual character.

A further and subordinate object is to provide a needle of the character above referred to which is more durable, follows the record with greater fidelity, and by reason of the peculiar manner in which it engages the record produces less wear upon the latter.

To the above ends the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

The invention will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a face view of a reproducer-head equipped with my invention. Fig. 2 is a side elevation of the same. Fig. 3 is an axial sectional view of the socket portion of the needle-arm and reproducing-needle seated therein. Fig. 4 is a side elevation of the filler-sleeve removed from the needle-arm socket. Fig. 5 is an elevation of my improved needle, shown on a magnified scale. Fig. 6 is a similar view of the needle heretofore in common use, likewise shown on a magnified scale, but magnified in the same proportion as is the needle shown in Fig. 5.

Referring to the drawings, 1 designates as a whole a reproducer-head of a usual construction, in so far as its general features are concerned, and provided with the usual reproducing-diaphragm 2 and vibratory arm 3,

mounted on the rim portion of the shell of the reproducer and operatively connected with the central portion of the diaphragm, as usual.

4 designates the socket-end portion of the arm 3, which in the present embodiment of my invention is shown as constructed to receive a reproducing-needle 5 of relatively large diameter. The needle of my present invention is comparatively slender or of small diameter, as indicated at 6, Figs. 3 and 5, and in order that a needle of this character may be fitted to the sockets of reproducers now in common use I provide a filler-sleeve designated as a whole 7. Said sleeve is of such exterior diameter as to fit snugly in the socket 8 of the reproducer-arm and is axially bored to receive the much smaller needle 6 of my invention, as shown clearly in Fig. 3. For convenience of manipulation the protruding end of the sleeve 7 is provided with an enlarged head 9, and in order that both the filler-sleeve and the needle may be held in position in the socket 8 by means of a single set-screw the sleeve is cut through at one side, as indicated at 10, to expose the side of the needle, and a set-screw 11 is threaded through the side of the socket portion 4 of the needle-arm and arranged to impinge at its inner end against the needle 6.

Describing more specifically the characteristics of the needle 6, I make the same of relatively slender construction or small diameter throughout and of a highly-resilient and moderately-hard metal. In practice I have found the steel commonly known as "piano-wire" to be well suited for this purpose and secure the most satisfactory results by using wire of about 11 gage. The needle is formed with a relatively fine or long tapered point 6', much resembling the point of an ordinary sewing-needle. The construction and arrangement of the parts by means of which the needle is united to the arm should be such as to insure a rigid connection—i. e., a connection free from vibration in the joints, such a connection being secured in the construction shown.

The character of the tone produced by a needle of my invention when used in conjunction with the ordinary commercial hard

records now in common use is much softer than the tones produced by the needles heretofore in use, and at the same time the reproduction is characterized by much greater
5 fidelity and by a marked absence of harsh or scratching notes. In other words, while the tones of an instrument equipped with my needle are not so loud they are more exact reproductions of the original sounds, the harmonics being especially improved and brought
10 out more distinctly.

The resilience of the needle is found to increase its longevity, the wearing away or blunting of the point being much less rapid and
15 less perceptible than in the case of a rigid or substantially non-resilient needle, even though the latter be of the hardest practicable temper. Moreover, I have found in practice that when my improved needle is used in connection with
20 a gramophone-record—*i. e.*, a record in which the undulations or deviations are formed laterally with reference to the face of the record—the wear of the point of the needle upon the record is much less than is the case with a
25 needle of blunter and more rigid construction.

It is to be noted that although the needle is sufficiently long, slender, and resilient to yield in itself to the irregularities of the record, and thus largely dampen the harsher noise,
30 the same is sufficiently rigid to support the reproducer from its clamped end and to transmit to the reproducer-arm the fundamental tones and overtones produced by the lateral sinuosities of the record.

It will be obvious that a needle embodying my invention may be fitted directly in a suitably-formed reproducer-arm socket without the interposition of the filler-sleeve or its
35 equivalent.

Accordingly I do not limit myself to the exact details of the invention shown herein, except to the extent that such details are made the subject of specific claims.

I claim as my invention—

45 1. In combination with a gramophone reproducer-head and the diaphragm thereof, of a vibratory arm formed of rigid material having a high sound-conducting coefficient supported upon the frame of the head and connected to the diaphragm, a socket carried by
50 said arm and a needle formed of highly-resilient hard metal, the body portion whereof is of substantially cylindrical form, approxi-

mately 11-gage diameter, terminates at one end in a fine point and at its opposite end is
55 adapted to said socket, whereby the needle is supported to extend freely from the socket and is free to flex by reason of its resiliency throughout its projecting length.

2. A gramophone-needle of wire having one
60 end adapted to be clamped in an ordinary gramophone reproducer-arm its other end sharpened and free to move laterally when the needle is so clamped and a record is being reproduced, said needle being sufficiently long
65 slender and resilient to yield in itself to the irregularities of the record and thus largely dampen the harsher noise but sufficiently rigid to support the reproducer from its clamped end and to transmit to the reproducer-arm the
70 fundamental tones and overtones produced by the lateral sinuosities of the record.

3. In a device of the character described, a needle-support provided with a socket, a removable sleeve open at one side, and a clamping
75 means, whereby the diameter of the socket may be varied to receive needles of different sizes, said sleeve and needle being secured by the same clamping means.

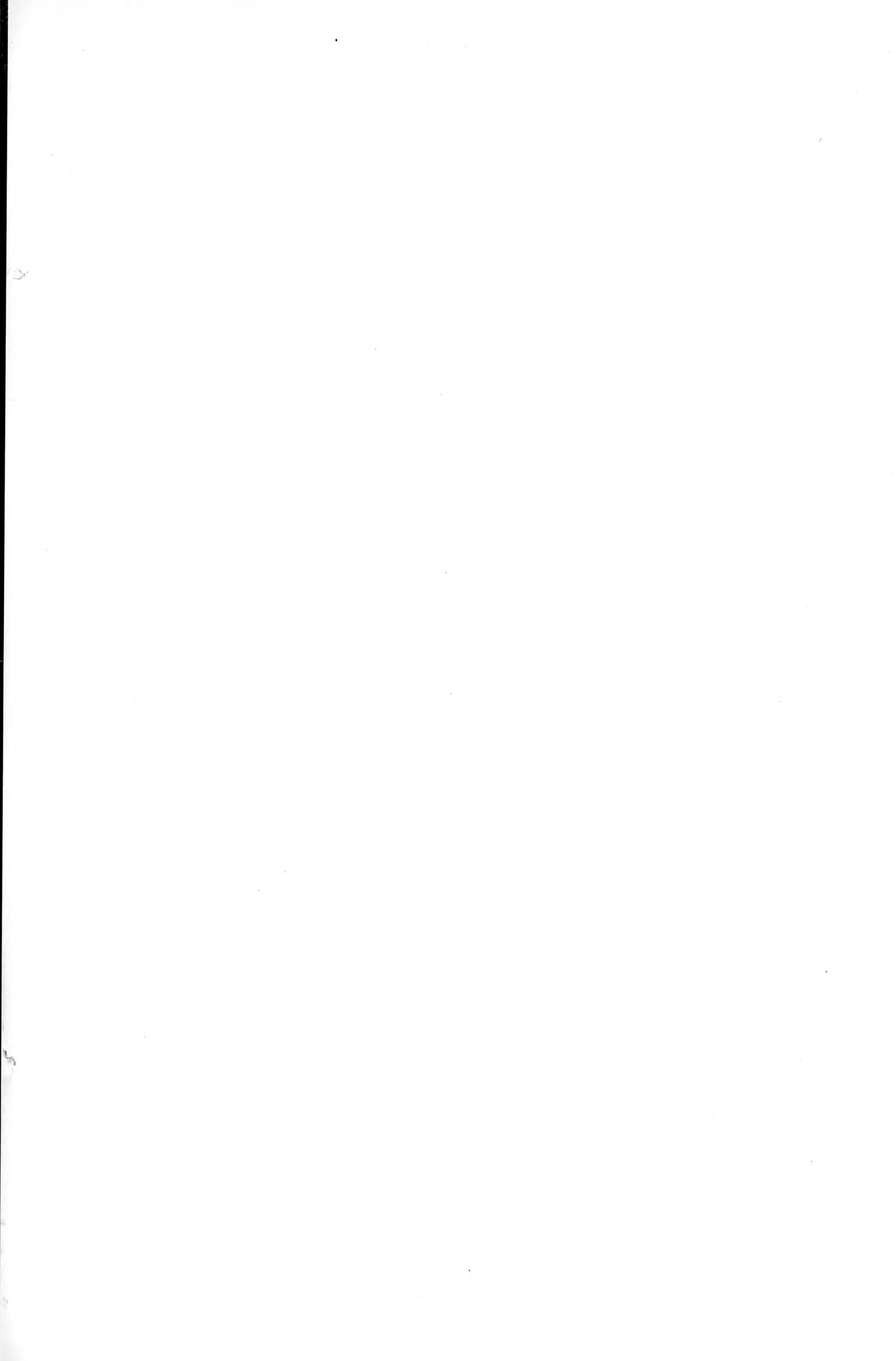
4. A gramophone-needle of wire substantially
80 straight throughout and having one end adapted to be clamped in an ordinary gramophone reproducer-arm its other end sharpened and free to move laterally when the needle is
85 so clamped and a record is being reproduced, said needle being sufficiently long slender and resilient to yield in itself to the irregularities of the record and thus largely dampen the
90 harsher noise but sufficiently rigid to support the reproducer from its clamped end and to transmit to the reproducer-arm the fundamental tones and overtones produced by the lateral sinuosities of the record.

5. In a reproducer-head of the character described, the combination of a vibratory arm
95 provided with a socket, a sleeve fitting said socket and provided with a longitudinal bore and also with a lateral recess, a highly-resilient slender reproducer-needle fitting the bore of said sleeve, and a set-screw threaded through
100 the side of the arm-socket, entering the recess of the sleeve and engaging said needle.

JULIUS J. NEUMANN.

Witnesses:

FREDERICK C. GOODWIN,
ALBERT H. GRAVES.



No. 771,758.

PATENTED OCT. 4, 1904.

C. N. WURTH.
PHONOGRAM OR SOUND RECORD.

APPLICATION FILED JUNE 10, 1904.

NO MODEL.

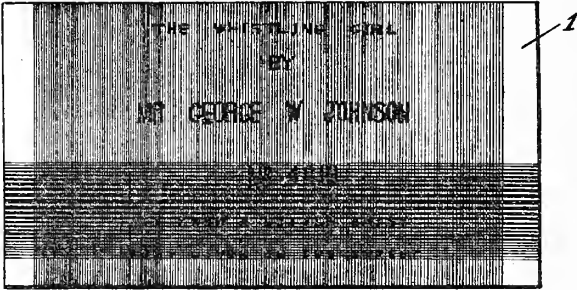


Fig. 1

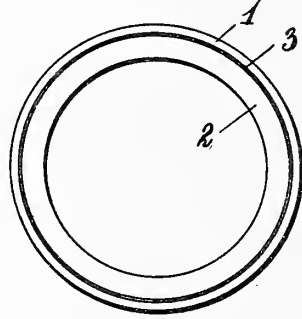


Fig. 2

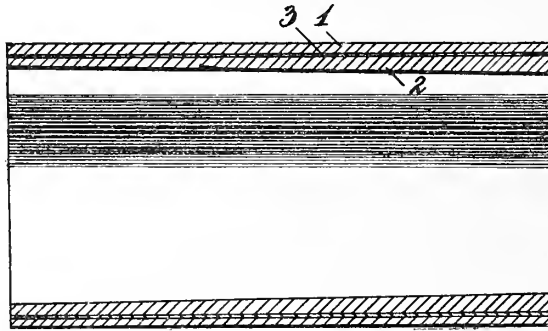


Fig. 3

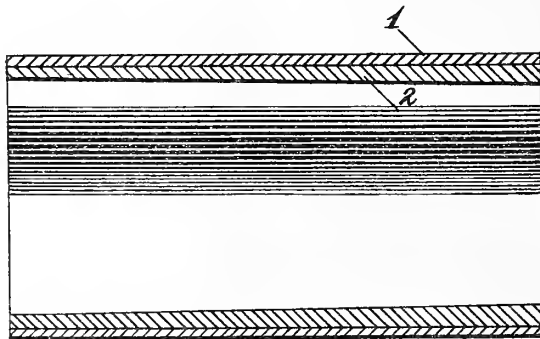


Fig. 4

WITNESSES:

Delos Stoddard
Alexander Elliott

INVENTOR

Charles S. Murch

BY

Frank L. Spear
ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES N. WURTH, OF ORANGE, NEW JERSEY.

PHONOGRAM OR SOUND-RECORD.

SPECIFICATION forming part of Letters Patent No. 771,758, dated October 4, 1904.

Application filed June 10, 1904. Serial No. 211,920. (No model.)

To all whom it may concern:

Be it known that I, CHARLES N. WURTH, a citizen of the United States, residing at Orange, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Phonograms or Sound-Records, of which the following is a specification.

My invention has for its object the production of a novel phonogram which is provided with an inscription which may refer to the title, author, &c., of the matter recorded upon the said phonogram or which may consist of advertising matter.

Heretofore it has been common to place the title of a phonogram upon the same by molding the characters thereon in the process of manufacture or by stamping the same upon the finished article. It is obvious that when an inscription is applied in either of these manners it can be applied only to those portions of the phonogram which are not used to receive the sound-record, and the ends of the phonogram have been heretofore used for this purpose. These parts ordinarily are of sufficient extent to receive only the title of the selection and the catalogue-number thereof. By my invention I am enabled to use the entire length or extent of the phonogram for the inscription.

In the drawings which accompany this specification, Figure 1 is a side view of a phonogram or sound-record to which my invention is applied. Fig. 2 is an end view thereof. Fig. 3 is a longitudinal section of the phonogram of Figs. 1 and 2, and Fig. 4 is a similar view of a modification.

In the several views corresponding parts are indicated by the same numerals of reference.

In carrying out my invention in its preferred form I make use of a hollow cylinder 1, of a transparent material—such as celluloid, collodion, or the like—upon which the record is formed by molding when in a plastic condition by any well-known process. The cylinder 1 is supported upon another cylinder or core, 2, which may be of any material suitable for supporting the said cylinder 1. Between these cylinders I insert a slip 3, of suitable

material, such as paper, upon which the inscription is printed or otherwise inscribed. If desired, the slip may carry a photograph of the author or composer of the selection forming the sound-record or of the person or persons rendering such selection, and the word "inscription" appearing in the specification and claims includes a photograph. This slip may be secured upon the core 2 before the same is inserted within the cylinder 1. The contraction of the cylinder 1 causes the same to bind tightly upon the core, as is well known. The inscription upon the slip 3 can be plainly read through the cylinder 1 and is thereby protected against being rubbed off or obliterated. When desired, the slip 3 may be dispensed with, and the inscription may be applied either upon the core 2 or interior of the transparent cylinder 1 before these parts are assembled to form the phonogram shown in Fig. 4.

It will be seen that the placing of the inscription below the surface of a transparent covering is of great advantage in protecting the inscription from defacement. Certain advantages of my invention may be obtained by placing the inscription in any suitable manner upon the exterior of the phonogram upon that portion of the same which carries the record. This may be done in any suitable manner—as, for example, by sensitizing the outer surface of the cylinder 1 and photographing the inscription or portait thereon by means of a negative before the same is molded into a record.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a phonogram or sound-record, comprising a transparent outer member, and an inner member carrying an inscription, substantially as set forth.

2. As a new article of manufacture a phonogram or sound-record provided with an inscription, said inscription being situated beneath the surface of the phonogram, substantially as set forth.

3. As a new article of manufacture a phonogram or sound-record provided with an inscription, said inscription being situated be-

neath the surface of the phonogram, and referring to the matter comprising the sound-record of the phonogram, substantially as set forth.

5 4. As a new article of manufacture, a phonogram or sound-record provided with an inscription, said inscription being situated within the transverse limits of that portion of the phonogram which carries the record, substantially as set forth.

10 5. As a new article of manufacture a phonogram or sound-record provided with an inscription, said inscription being situated within the transverse limits of that portion of the
15 phonogram which carries the record, and re-

ferring to the matter comprising said record, substantially as set forth.

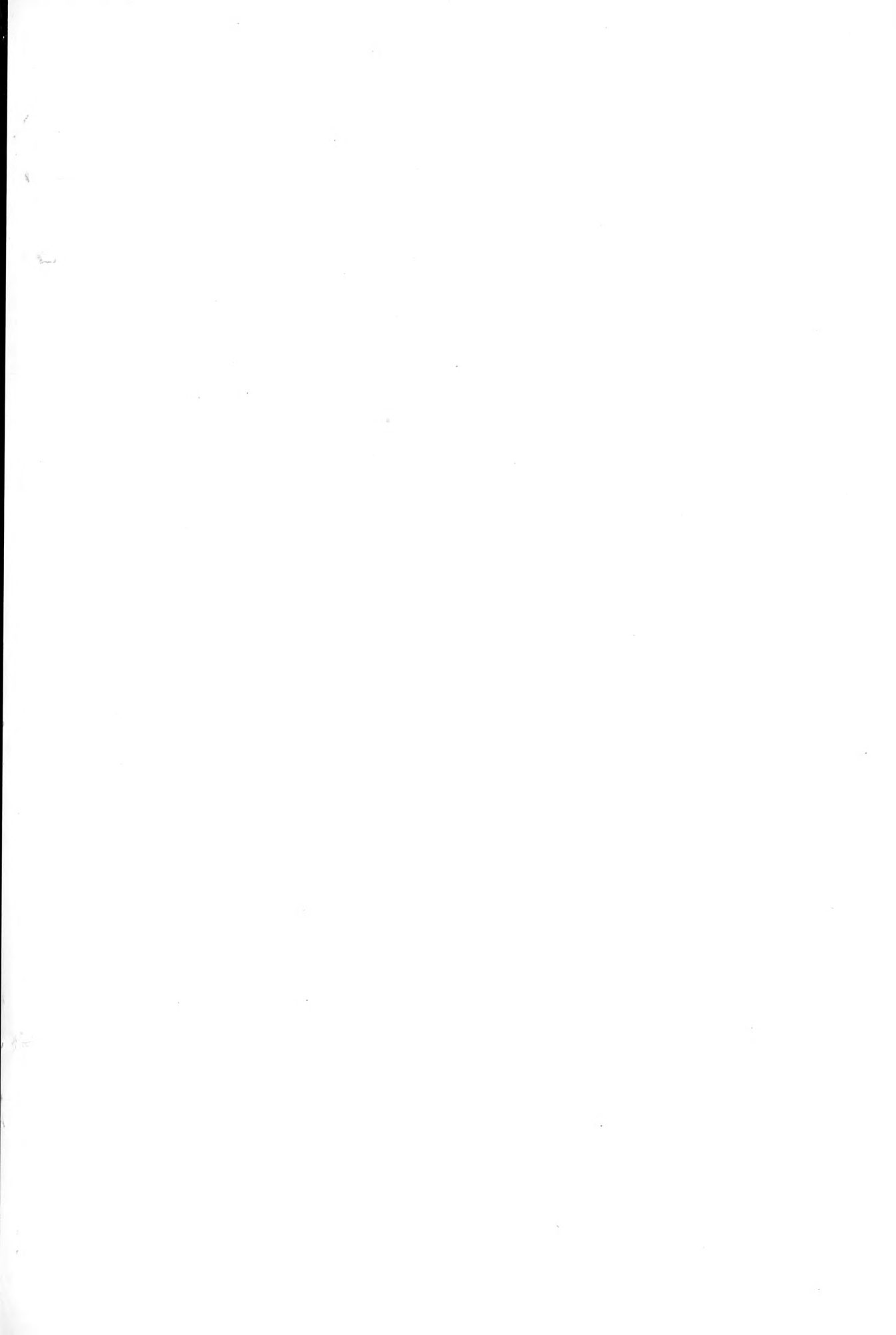
6. As a new article of manufacture, a phonogram or sound-record consisting of an inner supporting-cylinder, an outer transparent cylinder, and a slip of suitable material placed between said transparent and supporting cylinders, and carrying an inscription, substantially as set forth. 20

In witness whereof I have hereunto signed my name this 14th day of May, 1904. 25

CHARLES N. WURTH.

In presence of—

HANSON C. COXE,
JOHN BAKER.



No. 771,851.

PATENTED OCT. 11, 1904.

P. WEBER.

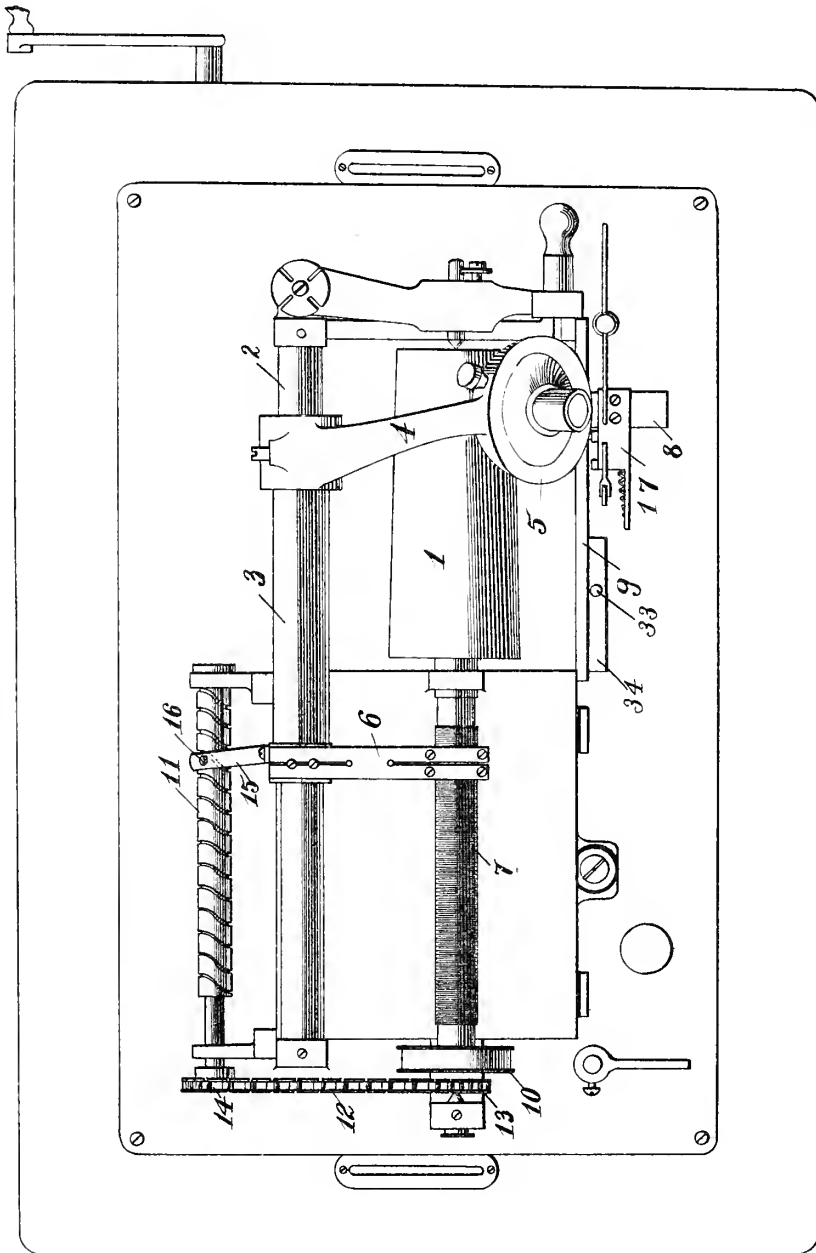
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED OCT. 1, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1

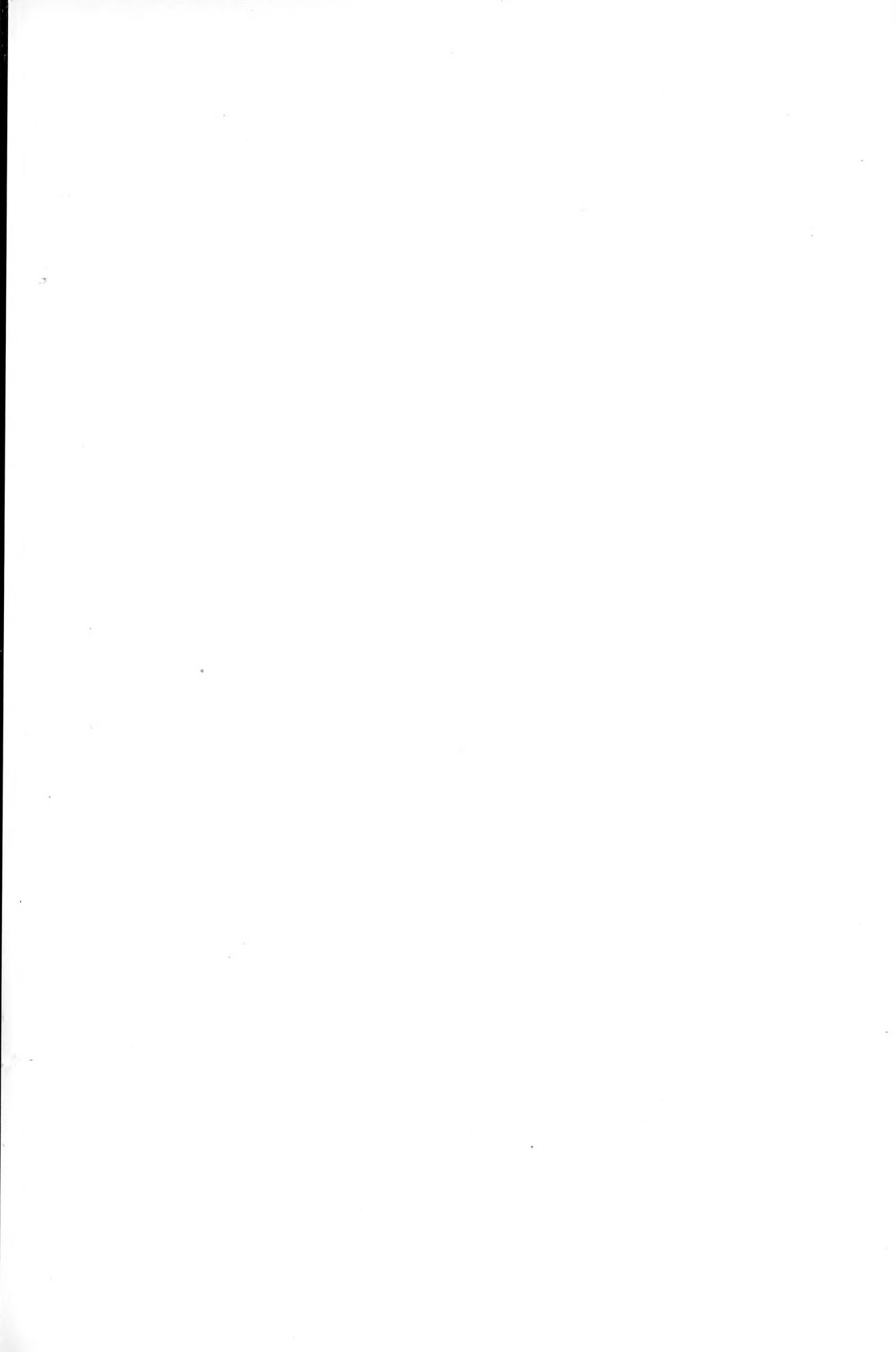


Witnesses:

Ludwig F. Weber
Wm. A. Dolan

Inventor

Peter Weber
by *Frank L. Spier*
Attorney.

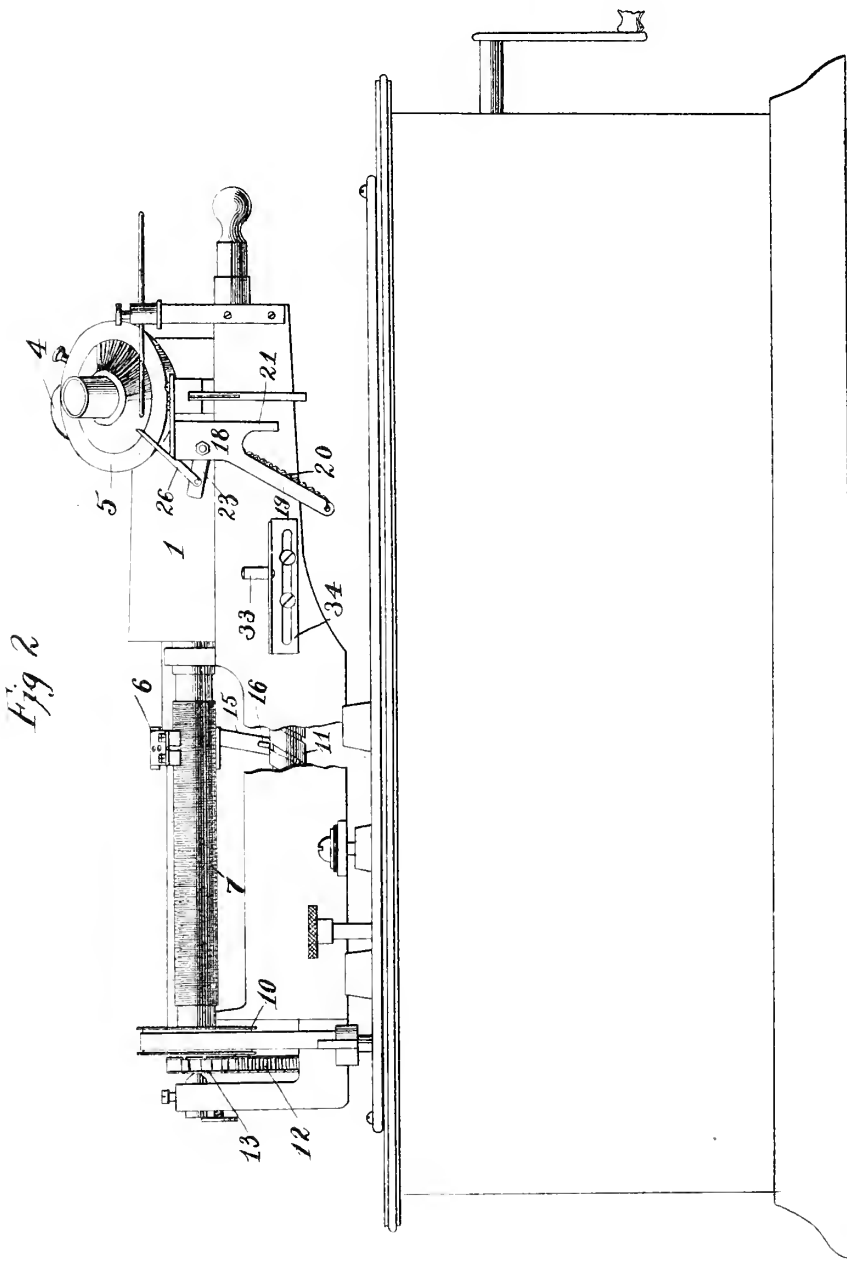


P. WEBER.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED OCT. 1, 1903.

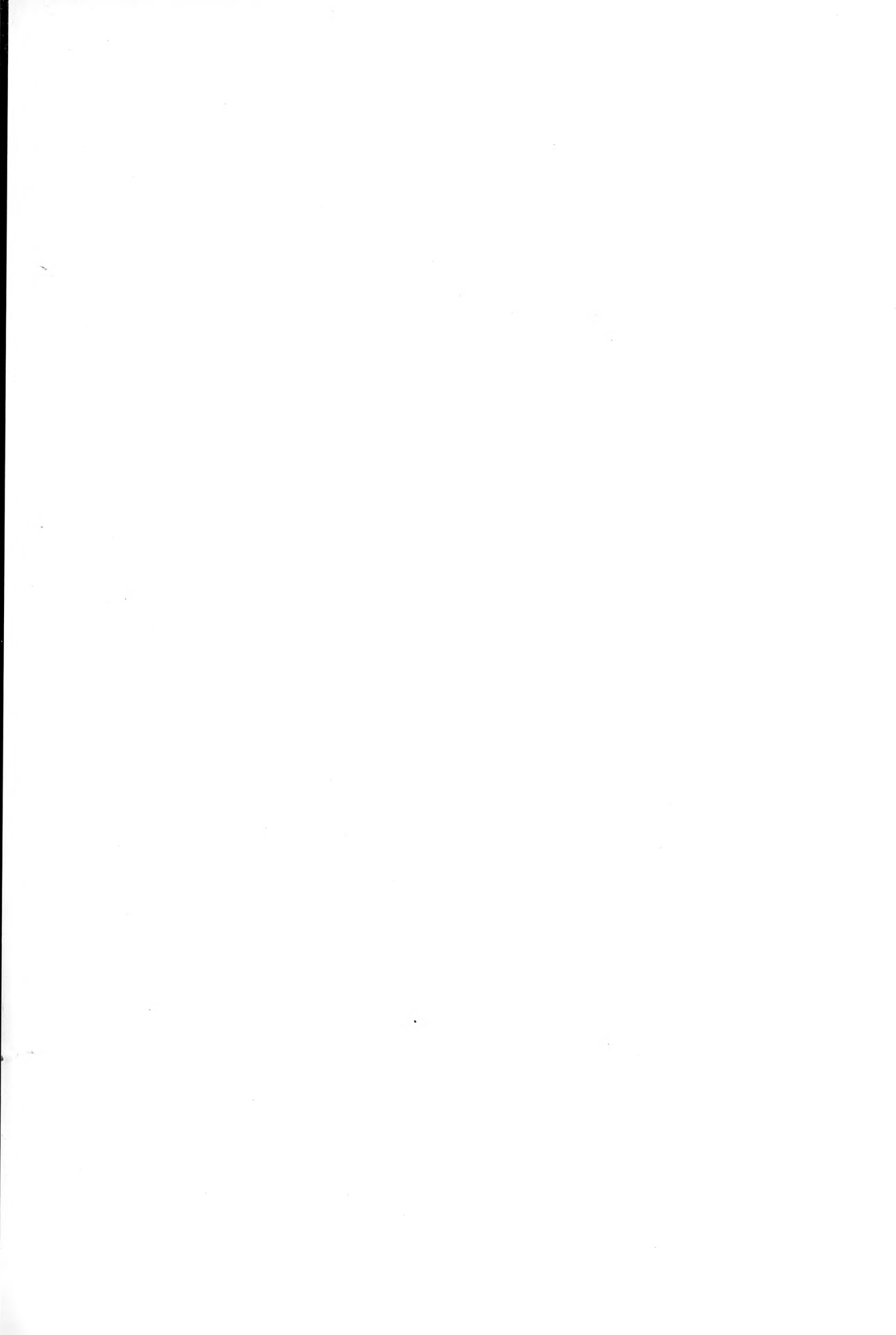
NO MODEL.

3 SHEETS—SHEET 2.



Witnesses:
Ludwig F. Alt
Wm. Dolan

Inventor
Peter Weber
 by *Frank L. Ryan*
 Attorney.

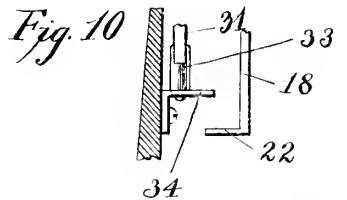
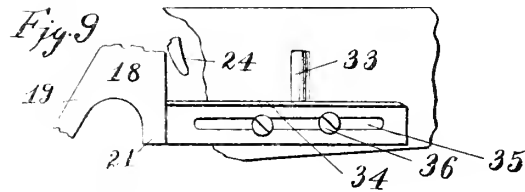
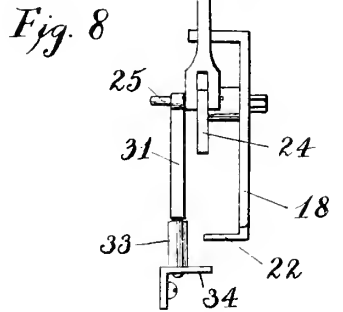
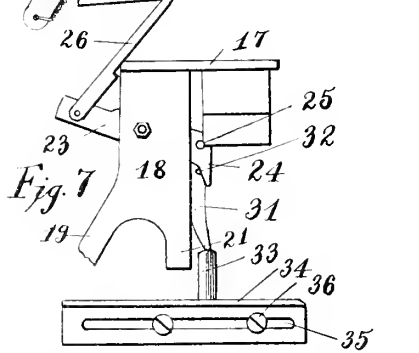
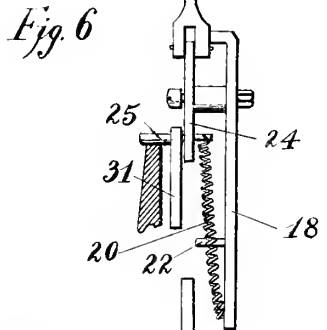
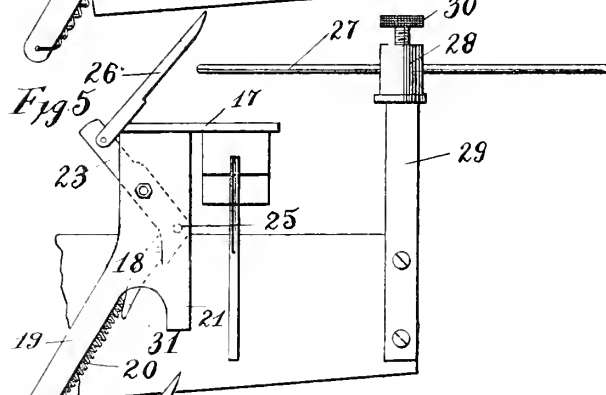
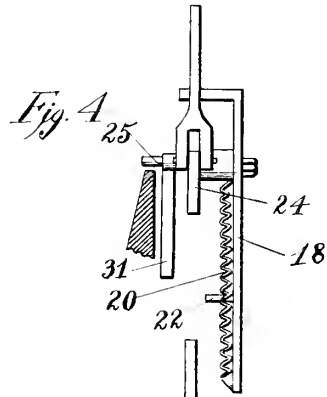
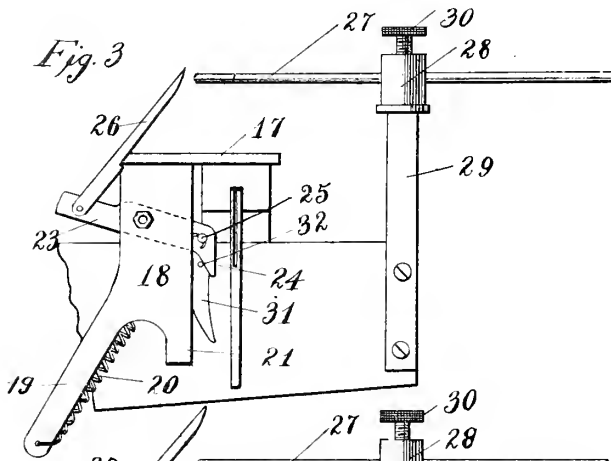


P. WEBER.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED OCT. 1, 1903.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses:

Ludwig Felt
W. M. Nolan

Inventor

Peter Weber
by *Frank L. Rippe*
Attorney.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 771,851, dated October 11, 1904.

Application filed October 1, 1903. Serial No. 175,402. (No model.)

To all whom it may concern:

Be it known that I, PETER WEBER, of Orange, in the county of Essex and State of New Jersey, have invented certain Improvements in Repeating Attachments for Phonographs, of which the following is a description.

My invention relates to various new and useful improvements in repeating attachments for phonographs, either in connection with those instruments in which the record is to be repeated indefinitely or in connection with those instruments in which the motor is controlled by dropping a coin in the slot and wherein it is necessary that the reproducing device should automatically be returned to the commencement of the record ready for a new reproduction.

The object of my invention is to provide a simple and improved apparatus for the purpose, one which can be readily applied to phonographs or allied talking-machines of existing types without detracting from the appearance of the latter and which shall be simple in construction and entirely certain in its operation.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a plan view of a phonograph of common type with my special improvements attached thereto, the reproducer-horn being removed for purposes of clearness; Fig. 2, a front elevation of the same; Fig. 3, a front elevation of the tripping mechanism in the position which it occupies during the reproduction; Fig. 4, a view taken at right angles to Fig. 3, showing the same parts; Fig. 5, a view corresponding to Fig. 3, illustrating the parts of the tripping mechanism after a tripping operation has taken place and before the reproducer begins its return movement; Fig. 6, a view taken at right angles to Fig. 5, showing the same parts in the same position; Fig. 7, a front elevation of the tripping mechanism, illustrating the same as having just been returned to its operative position, which

action takes place during the return movement of the reproducing devices; Fig. 8, a view taken at right angles to Fig. 7, showing the same parts in the same position; Fig. 9, a front elevation of the tripping devices in the position which they occupy when the reproducer commences to move to again effect a reproduction of the record; and Fig. 10, a view taken at right angles to Fig. 9, showing the same parts in the same position.

In all of the above views corresponding parts are represented by the same numerals of reference.

The phonograph shown in the views is of a common type, being provided with a mandrel 1, a back rod 2, on which travels a sleeve 3, to which is secured the arm 4, carrying the eye 5, in which are mounted the usual reproducing devices, said sleeve being also provided with a spring-arm 6, carrying a nut on its end which engages with the usual feed-screws 7. Projecting outwardly from the eye 5 is the extension 8, which travels on the usual front bar 9 of the phonograph. The mandrel 1 is driven from a pulley 10 from any suitable motor. (Not shown.) When the repeating attachment is to be used for effecting an indefinite repetition of a given record, this motor may be stopped and started by the usual manually-operated devices; but when the attachments are to be used in connection with sound-reproducing machines which are adapted to be controlled by the introduction of a coin in a slot suitable and appropriate mechanism is to be used for effecting the stopping of the motor at the proper time. Mechanism of this latter type is well known to skilled persons in this art and requires no detailed description here. Mounted in a suitable bearing behind and somewhat below the feed-screw 7 is a return-shaft 11, having a thread of great pitch cut therein, so that the reproducing devices will be very rapidly returned to the starting position at the proper time. This return-shaft is operated in any suitable way—as, for example, by means of a light chain 12 passing over a sprocket-wheel 13 on the shaft of the feed-

screw 7 and over a similar sprocket-wheel 14 on the shaft of the return-screw 11. Secured to the sleeve 3 is a short spring-arm 15, which is provided at its free end with a pin 16, adapted to engage the thread of the return-shaft 11 when the sleeve 3 is slightly rocked on the back rod 2, as takes place at the commencement of the return movement of the reproducing devices, when the reproducer is elevated from the record and the feed-nut is simultaneously disengaged from the feed-shaft 7. Secured to the extension 8 of the phonograph-arm 4 is a plate 17, having a downwardly-extending front portion 18, formed with a bifurcated lower end, as shown, one arm, 19, forming an anchor for the lower extremity of a spring 20 and the other, 21, being provided with an inturned finger 22, which performs important functions in the operation of the devices, as will be presently described. Mounted on the back side of the plate 18 is a lever 23, having a downturned tail 24 at its end. Secured to this lever near one of its free ends is a pin 25, which is adapted to engage the front bar 9 of the phonograph to elevate the reproducer from the record after the latter has been reproduced and simultaneously elevate the feed-nut from the feed-screw 7 and engage the pin 16 with the return-screw 11. The lever 23 is normally locked in position to maintain the pin 25 out of engagement with the front bar 9, by means of a trip-arm 26, having a notch therein, as shown, which normally engages the adjacent edge of the plate 17.

In order to actuate the trip-arm so as to free the lever 23 after the record has been reproduced, I make use of a releasing-rod 27, which is arranged in the path of travel of the trip-arm as the latter moves with the reproducing devices. This releasing-rod 27 is supported in an eye 28, carried by a bracket 29, which is removably secured to the front of the phonograph, and said releasing-rod is locked in any position of adjustment in said eye by a thumb-screw 30, as shown. By varying the position of the releasing-rod in its support it will be evident that the trip-arm 26 can be actuated at any position of the operative stroke of the reproducing devices, whereby the return mechanism can be brought into operation to return the reproducing devices to the starting-point immediately after the record has been reproduced. The spring 20 connects with the free end of the lever 23, so that as soon as said lever is released by the trip-arm 26 the spring will move the lever pivotally to engage the pin 25 with the front bar 9 of the phonograph and elevate the reproducer from the record. In order to reset the lever 23 during the return movement of the reproducing devices, I make use of a resetting-arm 31, which is pivoted to said lever and which is provided with a pin 32, engaging the tail 24, as shown. On the return

movement of the reproducing devices the resetting-arm 31 engages a pin 33, carried by a plate 34, as shown. This plate is provided with a slot 35 therein, within which are mounted the screws 36 for holding the plate removably and adjustably in position on the front of the phonograph. By adjusting this plate in one direction or the other the reproducing devices may be made to engage the record at any point thereon. By thus employing adjusting mechanism for determining the time at which the reproducer shall engage the record as well as the time when the reproducer shall leave the record I secure a device in which no time is lost in the operation, since the parts can be adjusted to engage the reproducer with the record at the exact commencement thereof and to disengage the reproducer from the record at the exact conclusion thereof.

The finger 22 is so located with reference to the plate 34 as to be supported by said plate during a part of the return movement of the reproducing devices, so as to still hold the latter out of engagement with the record, while during the operating movement of the reproducing devices in effecting a reproduction of the record the finger 22 travels beneath said plate 34 and out of engagement with the same, as will be explained.

The operation of my improved mechanism will be readily understood. Normally—that is to say, when the reproducing devices are in engagement with the record—the lever 23 will be locked in its operative position by means of the trip-arm 26, the pin 25 being just out of contact with the front bar 9, although it will of course be understood that, if desired, the arm 4 can be supported at its free end at all times by means of the pin 25; but such an arrangement is not a desirable one. In the operative position of the parts the finger 22 will be located in line below the plate 34, as shown in Figs. 9 and 10. In effecting a reproduction of the record the phonograph operates in the usual way, the feed-screw 7 moving the reproducing devices laterally at the desired pitch, and in this lateral movement the finger 22 will travel beneath the plate 34. As the reproducing devices approach the end of the record the trip-arm 26 will engage the releasing-rod 27, and said arm will be tripped at the proper time, thereby freeing the lever 23 and permitting the spring 20 to operate the same pivotally, thus engaging the pin 25 with the front bar 9 of the phonograph, elevating the reproducing devices from the record, releasing the feed-nut from the screw 7, and engaging the pin 16 with the return-screw 11. The position of the parts immediately after the arm 26 has been tripped is shown in Figs. 5 and 6 of the drawings. The motor continuing to operate or the parts rotating by the momentum, the return-screw 11 will cause the reproducing

devices to partake of a return movement, the arm 4 being now supported by the pin 25 of the return mechanism. On the return movement of the parts the resetting-arm 31 will engage the pin 33, thereby tripping the lever 23 to its original position, or somewhat beyond that position, causing the notch on the trip-arm 26 to again engage the edge of the plate 17 to once more lock the lever 23 in its normal position. When the resetting-arm 31 leaves the pin 23, the finger 22 drops upon the plate 34 and still holds the reproducing devices in a withdrawn or elevated position free of the record. From this point, therefore, to the commencement of the record the reproducing devices will be sustained in their elevated position by the finger 22 traveling on the plate 34, as will be understood. When the finger 22 reaches the end of said plate, it drops off therefrom and permits the reproducing devices to again engage the record, the feed-nut being again engaged by the feed-screw 7 and the pin 16 being withdrawn from the return-screw 11. By adjusting the position of the plate 34 it will be seen that the finger 22 may be caused to leave the same at any desired position with respect to the record, whereby the reproducing devices may be caused to engage the same at any desired point thereon. During the operative movement of the reproducing devices the resetting arm 31 again engages the pin 33; but in this movement the pin 32 will be moved away from the tail 24, so that the movement of the resetting-arm will not affect the position of the lever 23.

The device is extremely simple in construction and operation, as will be seen, and has been found to be entirely certain and reliable in practical use.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In a repeating attachment for phonographs and allied talking-machines, in combination with the diaphragm-carrier, and means for returning the diaphragm-carrier to the starting position when the carrier is raised, means for raising said carrier comprising a spring carried by the carrier, means for holding said spring under elastic stress during the forward movement of the carrier, and means for tripping said holding means and thereby causing the spring to raise the carrier, substantially as set forth.

2. In a repeating attachment for phonographs and allied talking-machines, in combination with the diaphragm-carrier, and means for returning the diaphragm-carrier to its starting position when the carrier is raised, means for raising said carrier comprising a spring carried by the carrier, a latch for holding said spring under elastic stress during the forward movement of the carrier, and means for tripping said latch and thereby causing

the spring to raise the carrier, substantially as set forth.

3. In a repeating attachment for phonographs and allied talking-machines, in combination with the diaphragm-carrier, and means for returning the diaphragm-carrier to its starting position when the carrier is raised, means for raising said carrier comprising a spring, means for holding said spring under elastic stress during the forward movement of the carrier and adjustable means for tripping said holding means and thereby causing the spring to raise the carrier, substantially as set forth.

4. In a repeating attachment for phonographs and allied talking-machines, in combination with the diaphragm-carrier, means for returning the diaphragm-carrier to its starting position when the carrier is raised, means for raising said carrier comprising a support connected to said carrier and capable of vertical movement with respect thereto, a spring connected to said support for moving it and thereby raising said carrier, means for holding said spring under elastic stress during the forward movement of the carrier, and means for tripping said holding means and thereby causing the spring to raise the carrier, substantially as set forth.

5. In a repeating attachment for phonographs and allied talking-machines, in combination with the diaphragm-carrier, and means for returning the diaphragm-carrier to its starting position when the carrier is raised, means for raising said carrier comprising a pivoted lever carried by the carrier, a spring for operating said lever, means for holding said spring under elastic stress, and means for tripping said holding means and thereby causing the spring to operate the lever and raise the carrier, substantially as set forth.

6. In a repeating attachment for phonographs and allied talking-machines, in combination with the diaphragm-carrier, means for returning the diaphragm-carrier to its starting position when the carrier is raised, means for raising said carrier comprising a support connected to said carrier and capable of vertical movement with respect thereto, a spring connected to said support for moving it and thereby raising said carrier, means for holding said spring under elastic stress during the forward movement of the carrier, means for tripping said holding means and thereby causing the spring to raise the carrier, and means connected to the phonograph-frame for placing said spring under elastic stress during the return of the carrier, substantially as set forth.

7. In a repeating attachment for phonographs and allied talking-machines, in combination with the diaphragm-carrier, means for returning the diaphragm-carrier to its starting position when the carrier is raised, means for raising said carrier comprising a support connected to said carrier and capable of ver-

tical movement with respect thereto, a spring connected to said support for moving it and thereby raising said carrier, means for holding said spring under elastic stress during the forward movement of the carrier, means for tripping said holding means and thereby causing the spring to raise the carrier, and adjustable means connected to the phonograph-frame for placing said spring under elastic stress during the return of the carrier, substantially as set forth.

8. In repeating mechanism for phonographs and allied talking-machines, the combination with a mandrel, a feed-screw and reproducing devices, of a pivoted lever carried with the reproducing devices and arranged when released to elevate the reproducing devices with respect to the mandrel, means for freeing said lever during the operative movement of the reproducing devices, whereby the latter will be elevated from the record, means for resetting such devices during the return movement of the reproducer, a finger carried by the reproducer, and a plate with which said finger engages after the tripping mechanism

has been reset, substantially as and for the purposes set forth.

9. In repeating mechanism for phonographs and allied talking-machines, the combination with a mandrel, a feed-screw and reproducing devices, of a pivoted lever carried with the reproducing devices and arranged when released to elevate the reproducing devices with respect to the mandrel, means for freeing said lever during the operative movement of the reproducing devices, whereby the latter will be elevated from the record, means for resetting such devices during the return movement of the reproducer, a finger carried by the reproducer, a plate with which said finger engages after the tripping mechanism has been reset, and means for adjusting the position of said plate longitudinally of the record, substantially as and for the purposes set forth.

This specification signed and witnessed this 28th day of September, 1903.

PETER WEBER.

Witnesses:

FRANK L. DYER,

WM. A. DOLAN.

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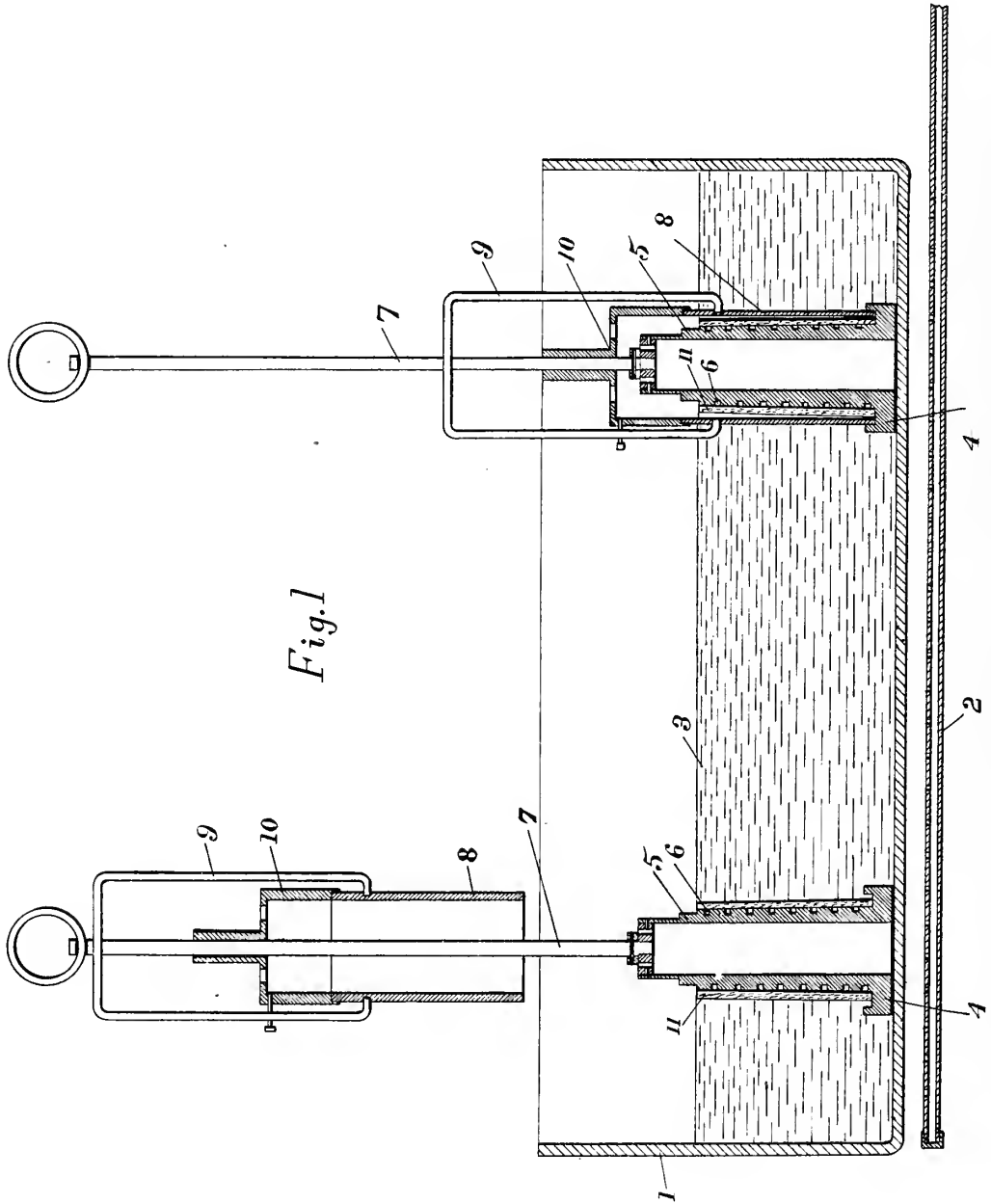
No. 771,880.

PATENTED OCT. 11, 1904.

W. H. MILLER & A. N. PIERMAN.
PROCESS OF MANUFACTURING CYLINDRICAL PHONOGRAPH RECORDS
OR BLANKS.

APPLICATION FILED OCT. 23, 1903.

NO MODEL.



Witnesses:

Ludwig F. Ott
Robert Roper.

Inventors

Walter H. Miller
Alexander S. Pierman.
by Frank L. Roper
Attorney.

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MANUFACTURING CYLINDRICAL PHONOGRAPH RECORDS OR BLANKS.

SPECIFICATION forming part of Letters Patent No. 771,880, dated October 11, 1904.

Application filed October 23, 1903. Serial No. 178,175. (No model.)

To all whom it may concern:

Be it known that we, WALTER H. MILLER, residing at Orange, and ALEXANDER N. PIERMAN, residing at Newark, in the county of Essex and State of New Jersey, citizens of the United States, have invented certain new and useful Improvements in Processes of Making Cylindrical Phonograph Records or Blanks, of which the following is a description.

Our invention relates to an improved process for making cylindrical phonograph records or blanks, and particularly of the type described and claimed in our Patent No. 726,966, dated May 5, 1903, wherein a mass of fibrous material, such as cotton-wool, is distributed throughout a cylindrical record or blank, the wax-like substance impregnating the fibrous material, so as to produce a substantially indestructible article. In our Patent No. 726,965, dated May 5, 1903, we describe a process for making such articles consisting in first wrapping a sufficient layer of the fibrous material around a core located within a suitable mold and then in permitting a molten wax-like material to enter the space between the core and the mold from below, so as to thoroughly impregnate the fibrous mass. We find from experiment that when the fibrous mass is sufficiently thick as to loosely fill the space between the core and the mold or when the fibrous mass is relatively compressed, as when it is wound quite tightly around the core, the carrying out of the specific process of our prior patent under commercial conditions results in some cases in the trapping of air within the fibrous mass and the formation of air-bubbles on the surface of the resulting duplicate sound record or blank, so as to affect the commercial character of the latter. Consequently in the carrying out of the specific process of that patent under commercial conditions care would have to be observed not to have the fibrous mass too thick or too tightly wound on the core, and as a result the records or blanks made thereby would contain an undesirably small proportion of the fibrous material and would not therefore be as relatively indestructible

as records or blanks containing a larger proportion of the fibrous material.

The object of our present invention is to provide a process in which a larger proportion of fibrous material can be commercially used and in which the fibrous material can be more tightly wound on the core than with the process of our prior patent, whereby a superior quality of product can be obtained under commercial conditions.

To this end the invention consists in applying the fibrous mass to the core, then in permitting the fibrous mass to become thoroughly impregnated with the molten wax-like material while the latter is substantially free of the mold, so that the wax-like material instead of being confined to a very small path, as with our previous patent, can enter the fibrous mass throughout substantially its entire surface, and, finally, in bringing the mold into the proper relation to the fibrous mass to confine the proper quantity of wax-like material between the core and the mold as to result in the production of the desired article when the mold and core are removed from the molten wax-like material and the record or blank is allowed to set, after which it is separated from the core and then from the mold.

In order that our invention may be better understood, attention is directed to the accompanying drawing, forming a part of this specification, and in which we show a sectional view of the tank containing the molten wax-like material and showing two molds, one in the position which it occupies when the fibrous mass is being impregnated by the wax-like material and the other in the position which it occupies after the fibrous mass has been impregnated and just before the mold and core are removed.

The tank 1 is of any suitable character and size and is heated in any suitable way—as, for example, by a gas-burner 2. This tank contains a mass 3 of a suitable wax-like material in a molten condition. We preferably employ for this purpose the ordinary wax-like material of which modern duplicate phono-

graph-records are made: but any composition can be employed for the purpose so long as it is capable of being maintained in a molten condition and is substantially free of products of decomposition and presents a sufficiently hard and permanent record-surface on the finished product.

A base 4 carries a hollow core 5, the latter being preferably formed with a thread 6, so as to result in the formation of a spiral rib on the interior of the duplicate or blank, as will be understood. A handle 7 may be connected with the core, so as to remove the same from the tank when desired. A cylindrical mold 8 is employed, the bore of which is perfectly smooth when blanks are to be made or which carries the negative representation of a sound-record when duplicate sound-records are to be produced. This mold may be provided with a handle 9 for operating it. A cap 10 is preferably removably carried by the mold to permit a surplus of the wax-like material to accumulate above the mold, so that when the blank or duplicate record is cooling and setting any diminution in bulk due to shrinkage will be compensated for by added material supplied from the surplus bulk within the cap, as will be understood.

In carrying our process into effect we prefer to proceed substantially as follows: A mass 11 of a suitable fibrous material, preferably cotton-wool, is applied to the core 6 and is preferably made thick enough to loosely fill the space between the core and the mold. The base 4, core 5, with layer of fibrous material, and mold 8, with cap 10, are now assembled, as shown at the right of the drawing, and preferably heated in any suitable way to about the temperature of the molten material. This preliminary heating can be and in practice has been most effectively secured by immersing the assembled parts for several minutes in the molten material or in a separate tank containing similar material in a heated state. If a separate heating-bath is used, then after all the parts have been thoroughly heated to or substantially to the temperature of the material they are placed in the tank 1, after which the mold 8 and cap 10 are elevated to the position shown at the left, so as to directly expose the fibrous material to the molten mass. The latter, therefore, is free to enter the fibrous material, so as to impregnate the same, which it does in two or three seconds, and any air which may be contained within the fibrous mass will be permitted to escape to the surface. After the fibrous mass has been thus impregnated with the molten material the mold is moved to position over the core and is seated on the base 1, as shown at the right of the drawing, so as to retain the molten material between the core and the mold. The parts are now removed by elevating the handle 7, and after

the wax-like material has set sufficiently, as by cooling-water applied to the outside of the mold and to the inside of the core, the latter is removed, after which the duplicate sound record or blank is shrunk diametrically by a reduction of temperature applied in any suitable way, preferably by a water-jacket, and is then withdrawn longitudinally. The article is now finished by properly trimming the edges and by reaming the bore, if necessary. It will of course be understood that suitable provision should be made for maintaining the level of the molten wax-like material in the tank 1 as material is removed therefrom at each operation.

While our improved process has been particularly designed for use in the manufacture of indestructible sound records or blanks of the type described, it will be understood that by omitting the application of the mass of fibrous material to the core the process can be carried out in the manufacture of ordinary sound records or blanks with the advantage of reducing the possibility of air-bubbles appearing on the surface of the latter.

Having now described our invention, what we claim as new therein, and desire to secure by Letters Patent, is as follows:

1. A process of manufacturing sound records or blanks, which consists in introducing a core within a mass of molten wax-like material so as to surround the core, then in confining a portion of the wax-like material between the core and a mold, then in removing the core and mold from the molten material and in permitting the confined mass to set, and in finally removing the core from the set material, substantially as and for the purposes set forth.

2. A process of manufacturing sound records or blanks, which consists in introducing a core within a mass of molten wax-like material so as to surround the core, then in confining a portion of the wax-like material between the core and a mold, then in removing the core and mold from the molten material and in permitting the confined mass to set, then in removing the core from the set material, and in finally shrinking the resulting record or blank diametrically to clear the surfaces and removing it longitudinally from the mold, substantially as and for the purposes set forth.

3. A process of making indestructible records or blanks, which consists in applying a mass of fibrous material to a core, then in introducing the core and fibrous mass in a molten wax-like material which impregnates the mass, and finally in introducing a mold into the molten material so as to surround the fibrous mass and confine a portion of the wax-like material between the core and the mold, substantially as and for the purposes set forth.

4. A process of making indestructible records or blanks, which consists in applying a mass of fibrous material to a core, then in introducing the core and fibrous mass in a molten wax-like material which impregnates the mass, then in introducing a mold into the molten material so as to surround the fibrous mass and confine a portion of the wax-like material between the core and the mold, and finally in removing the core and mold from the molten wax-like material and allowing the material between the core and the mold to set, substantially as and for the purposes set forth.

5. A process of making indestructible records or blanks, which consists in applying a mass of fibrous material to a core, then in introducing the core and fibrous mass in a molten wax-like material which impregnates the mass, then in introducing a mold into the molten material so as to surround the fibrous mass and confine a portion of the wax-like material between the core and the mold, then in removing the core and mold from the molten wax-like material and allowing the material between the core and the mold to set, and finally in removing the core from the

set material, substantially as and for the purposes set forth.

6. A process of making indestructible records or blanks, which consists in applying a mass of fibrous material to a core, then in introducing the core and fibrous mass in a molten wax-like material which impregnates the mass, then in introducing a mold into the molten material so as to surround the fibrous mass and confine a portion of the wax-like material between the core and the mold, then in removing the core and mold from the molten wax-like material and allowing the material between the core and the mold to set, then in removing the core from the set material, and finally in shrinking the resulting sound record or duplicate diametrically so as to clear the surface and withdrawing it longitudinally from the mold, substantially as and for the purposes set forth.

This specification signed and witnessed this 22d day of October, 1903.

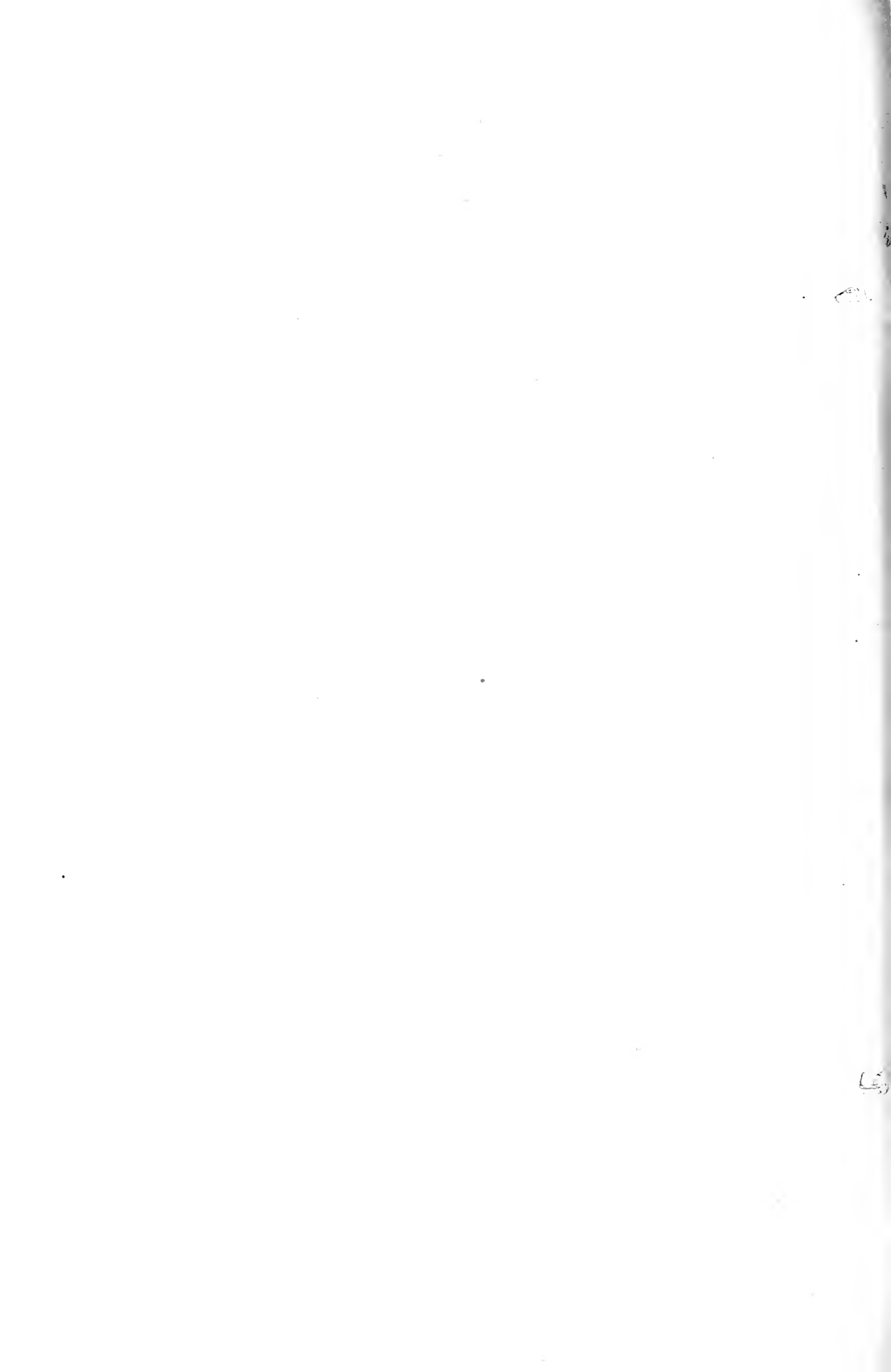
WALTER H. MILLER.

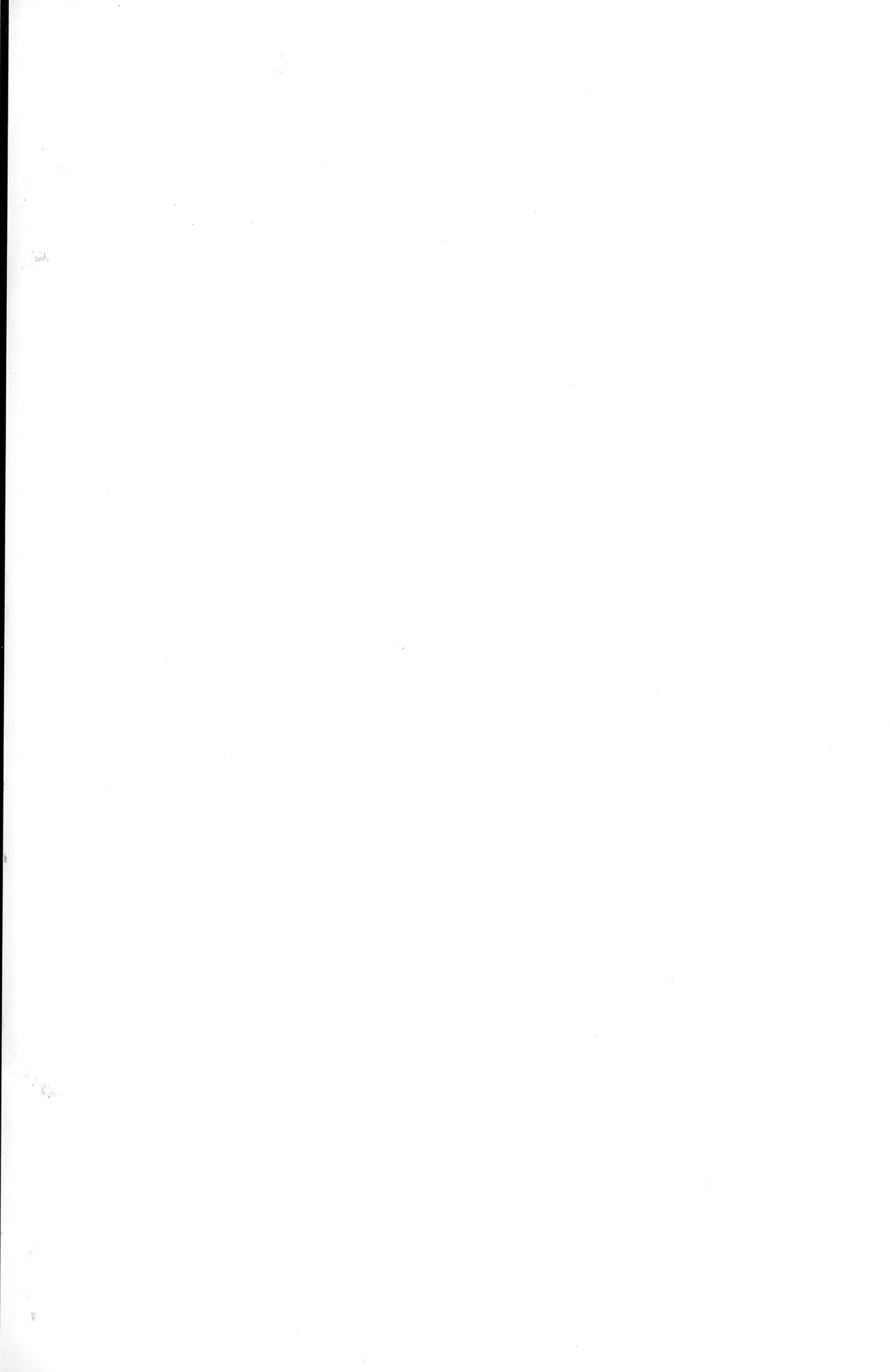
ALEXANDER N. PIERMAN.

Witnesses:

FRANK L. DYER,

WILLIAM A. DOLAN.





No. 772,485.

PATENTED OCT. 18, 1904.

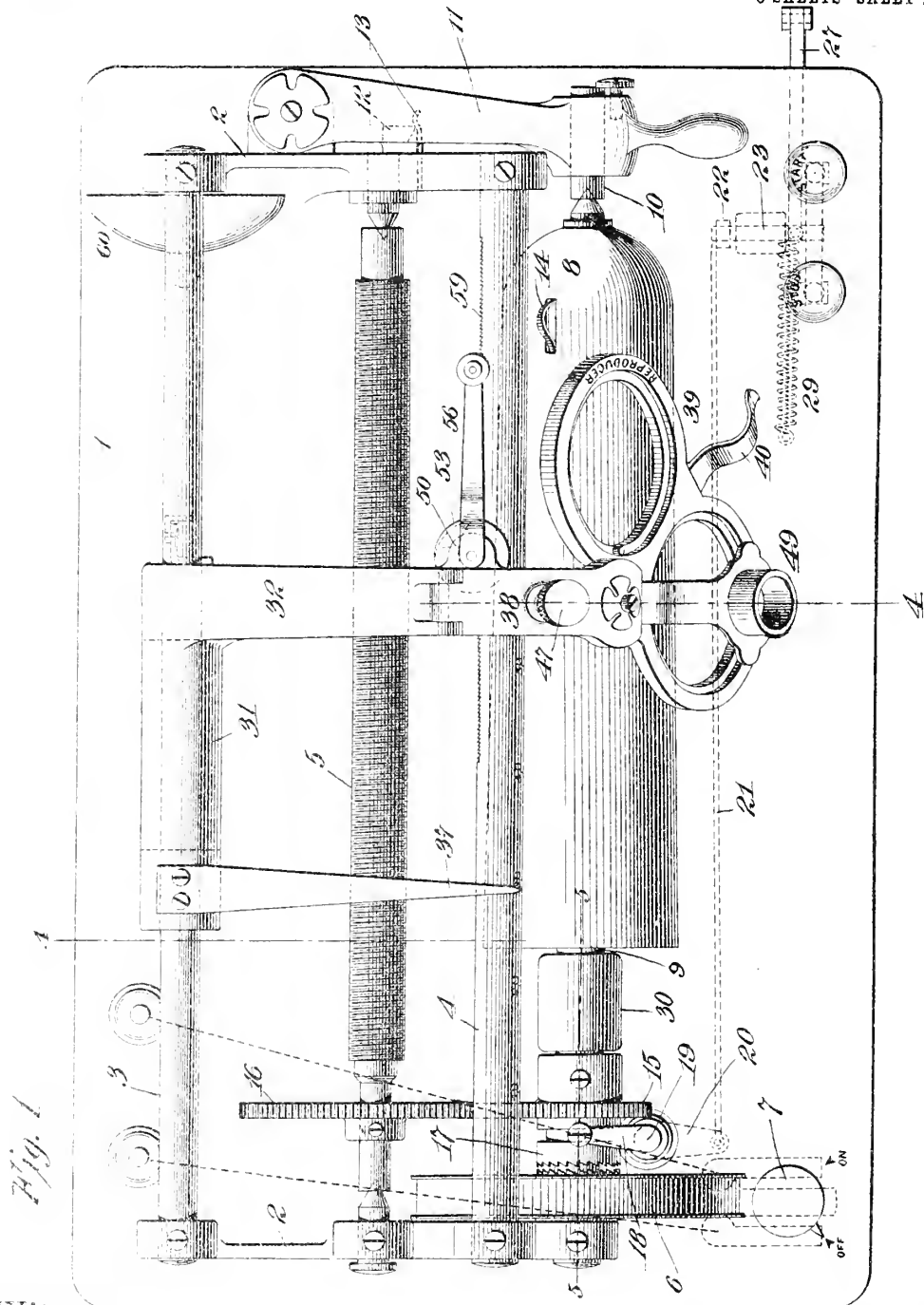
P. WEBER & C. L. HIBBARD.

PHONOGRAPH.

APPLICATION FILED SEPT. 10, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

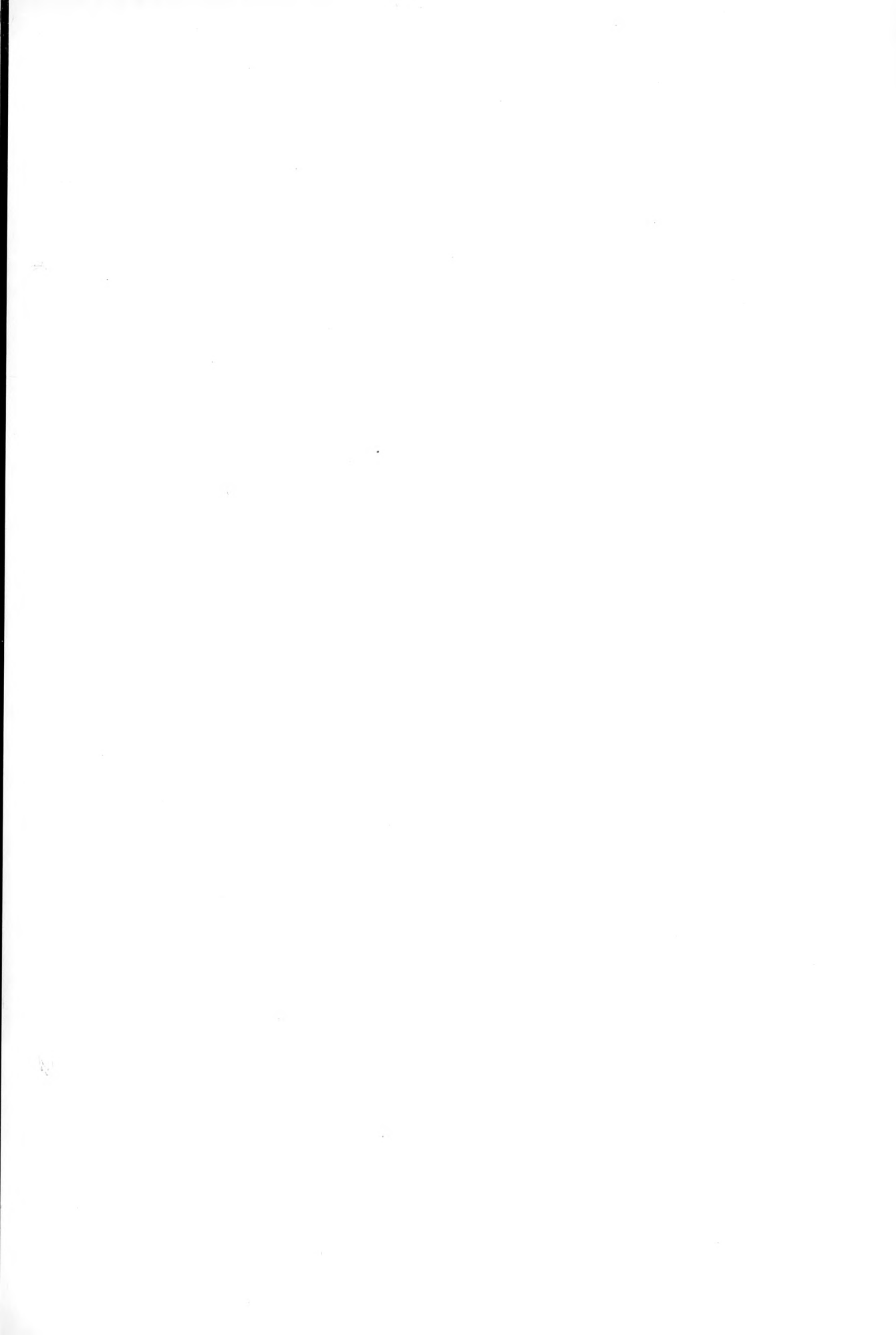
Ludwig F. Witt

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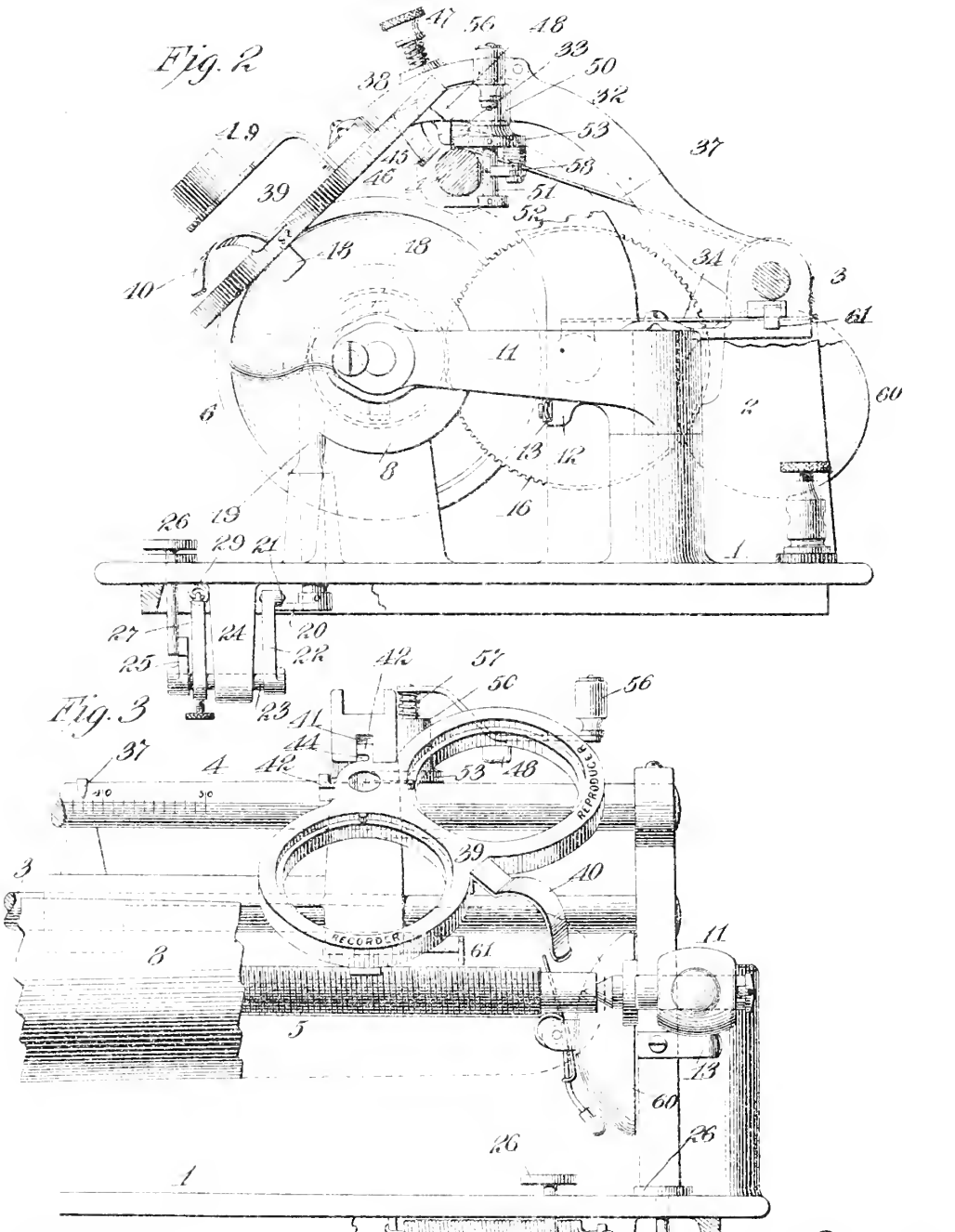
P. WEBER & C. L. HIBBARD.

PHONOGRAPH.

APPLICATION FILED SEPT. 10, 1903.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses:

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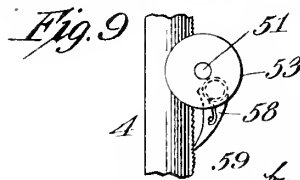
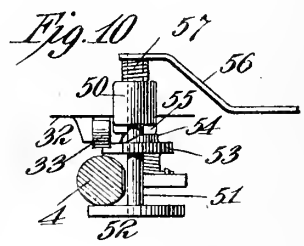
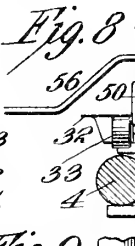
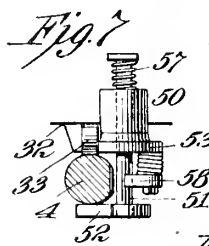
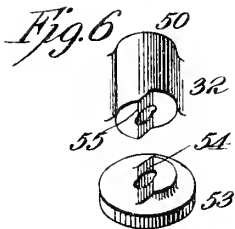
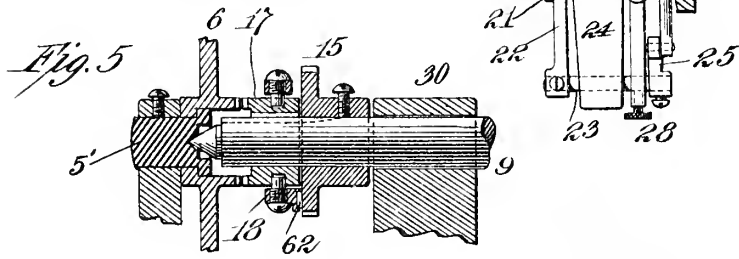
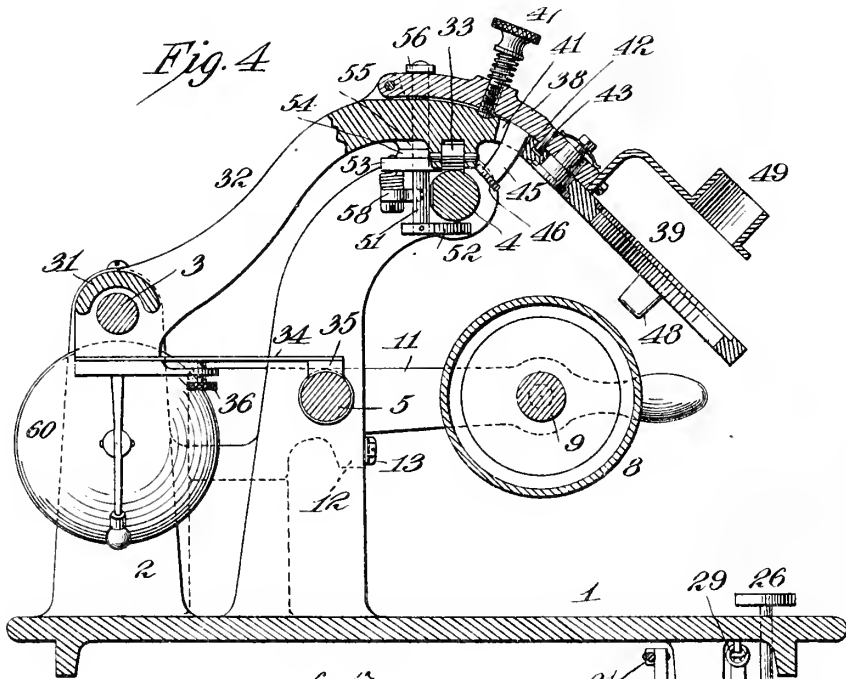


P. WEBER & C. L. HIBBARD.
PHONOGRAPH.

APPLICATION FILED SEPT. 10, 1903.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses:

Ludwig F. Ott

William A. Dalau

Inventors:

Peter Weber
Charles L. Hibbard

by Frank L. Ames
Attorney

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, AND CHARLES L. HIBBARD, OF WEST ORANGE, NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 772,485, dated October 18, 1904.

Application filed September 10, 1903. Serial No. 172,699. (No model.)

To all whom it may concern:

Be it known that we, PETER WEBER, residing at Orange, and CHARLES L. HIBBARD, residing at West Orange, in the county of Essex and State of New Jersey, have invented certain Improvements in Phonographs, of which the following is a description.

Our invention relates to improvements in phonographs; and our object generally is to provide details of construction, arrangement, and combination of parts by means of which the apparatus will be especially adapted for commercial purposes as an adjunct to the type-writer.

The features of novelty in our improved phonograph are hereinafter set forth and claimed.

We provide an improved end gate for supporting the free end of the mandrel and which is of simple and effective construction, permitting the blank to be readily removed and replaced into position and offering a very perfect bearing. We also provide an effective starting and stopping device for the mandrel, whereby the mandrel may be started and stopped practically instantaneously, and which mechanism also permits the mandrel to be controlled through the agency of a foot-pedal.

We also provide the phonograph with a scale by means of which the position of the recorder or reproducer at any part of the record may be noted, whereby any portion of the record may be located in order that corrections therein may be made during transcription, or such portions may be omitted. We also provide the improved phonograph with a warning-bell which gives an audible notification of the approach of the recorder toward the extreme end of the blank in somewhat the same manner as with the ordinary type-writer. We also provide the improved phonograph with a novel spectacle-frame for carrying separate recorders and reproducers. This spectacle-frame is so arranged that it may be locked rigidly in position to bring the recorder or reproducer in proper relation to the record, while at the same time it cannot be shifted unless the recorder or repro-

ducer is first elevated clear of the record to prevent injury to the latter. We also provide effective adjusting mechanism which simultaneously adjusts both the recorder and reproducer with respect to the record to secure the desired perfect operation. We also provide the phonograph with improved protecting devices, whereby when the recorder or reproducer has been adjusted for working on very thin blanks or records the use of a much thicker record or blank will not result in injury to the diaphragms, as might otherwise be the case. We also provide the apparatus with effective means by which the spectacle-frame and feed-nut may be first elevated and be then returned toward the starting position to the extent of a few threads, so that by bringing the reproducer into position any dictated matter can be repeated for purposes of verification. This repeating mechanism is also arranged in such a way as to maintain the spectacle-frame and feed-nut in an elevated position to permit the parts to be moved back and forth at will.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a plan view of our improved commercial phonograph, showing the spectacle-frame, but omitting the usual recorder and reproducer diaphragm-rings; Fig. 2, a side view looking at the machine toward the end gate; Fig. 3, a front elevation of a part of the machine, showing the mandrel broken away to illustrate the bell mechanism and showing also the arm for supporting the spectacle-frame removed, so as to illustrate the alining stops for the spectacle-frame; Fig. 4, a sectional view on the line 4 4 of Fig. 1; Fig. 5, a sectional view on the line 5 5 of Fig. 1, showing the clutch mechanism; Fig. 6, a perspective view of the two cams which comprise part of the repeating mechanism; Fig. 7, a sectional view of the elements comprising the repeating mechanism, showing the parts in their normal position; Fig. 8, a similar view showing the repeating-lever swung to one side to elevate

the spectacle-frame and return the same toward the starting position; Fig. 9, a detailed plan view of the parts in position shown in Fig. 8; and Fig. 10, a view corresponding to Fig. 8, except that the repeating-lever is moved in the opposite direction to withdraw the cam and to maintain the spectacle-frame permanently elevated to permit lateral movements thereof.

In all of the above views corresponding parts are represented by the same numerals of reference.

The base-plate 1 is provided with cast brackets 22. Mounted between said brackets is a stationary back rod 3 and a stationary guide-rod 4. The brackets are also provided with bearings for the feed-shaft 5. Mounted on a stub-shaft 5', located in one of the brackets 2, is the main driving-pulley 6, (see Fig. 5,) to which power is applied by any suitable form of motor carried beneath the bed-plate 1. When an electric motor is used, it may be controlled from a switch by a button 7. The mandrel 8 is much longer than usual and is also preferably somewhat larger in diameter, so as to take a blank of special size and of large capacity. The shaft 9 of the mandrel extends entirely through the same and at its rear end is formed as a cone which bears in a cup formed in the end of the stub-shaft 5'. (See Fig. 5.) The other end of this shaft is also coned and takes into the bearing-cup 10 on the end gate 11. This end gate is pivoted to one of the brackets 2, as shown, and is formed with a depending lug 12, (see Fig. 2,) with which the friction-spring 13 engages to lock the end gate in its closed position. This makes a very simple and effective construction and does away entirely with the necessity for special latches, which have to be first operated before the gate can be opened, as heretofore. The new gate is opened by a simple swinging movement.

Projecting through an opening in the mandrel 8 is a leaf-spring 14, over which the blank is forced and which acts as a friction-latch to prevent the blank from being accidentally displaced. The blank cannot be removed from the mandrel without compressing this spring, and the friction thereby imposed on the blank will be sufficient to turn it in use even if the blank does not tightly engage the mandrel. This feature prevents records working loose during use and failing to receive dictated matter before the defect is discovered.

Keyed to the mandrel-shaft 9 is a pinion 15, which meshes with and drives the gear 16 on the feed-shaft 5. The clutch member 17 is splined to said mandrel-shaft, so as to be movable longitudinally thereon. This clutch member is provided with ratchet-teeth which engage corresponding teeth on the hub of the driving-pulley 6, so that when said teeth are in engagement the driving-pulley will rotate the mandrel and feed shaft, as will be

evident. The yoke 18 engages the clutch member 17 and is carried by the shaft 19, working in the bearing on the bed-plate 1. At the bottom of this shaft 19 is an arm 20, which connects by a link 21 with the arm 22 on the rock-shaft 23, mounted in the bearing 24 on the under side of the bed-plate. Secured to the other end of this rock-shaft 23 is a small walking-beam 25, whose ends are connected with finger-pieces 26, indicated with the words "Stop" and "Start." By pressing down on the proper finger-piece the rock-shaft will be tilted, so as to swing the clutch into or out of engagement with the driving-pulley to start or stop the mandrel. In order that the starting and stopping device may be operated by the foot-pedal, we provide a lever 27, which may be connected at its ends with a foot-pedal (not shown) and which is adapted to be connected to the rock-shaft 23 by a thumb-screw 28. The spring 29 normally retracts the lever 27, so that when the latter is connected with the rock-shaft 23 the spring 29 will normally hold the clutch members out of engagement. By depressing the foot-pedal against the tension of the spring 29 the clutch members will be thrown into engagement, so as to drive the mandrel.

In order to properly support the mandrel when the end gate 11 is open, we extend the mandrel-shaft 9 through the bearing-sleeve 30, as heretofore.

Mounted to slide longitudinally on the back rod 3 is a frame 31, having an integral cast arm 32, which extends up over the rod 4 and is provided with a roller 33, which normally bears on said rod. The frame 31 is provided with a leaf-spring 34, carrying the feed-nut 35, engaging the feed-shaft 5 and adjustable by means of a thumb-screw 36. The frame 31 is also provided with an index or pointer 37, which extends over the rod 4 and cooperates with a scale thereon, as shown.

Pivoted to the arm 32 on a horizontal pivot is an arm 38, to which the spectacle-frame 39 is pivoted. This spectacle-frame is provided with a thumb-piece 40, by which it may be elevated and swung to one side or the other to bring the recorder or reproducer into the proper relation with the record or blank. The arm 32 is formed at its front edge with a slot or channel 41 therein, with which ears 42 on the spectacle-frame are adapted to engage, so as to center the spectacle-frame, with the recorder or reproducer in the proper relation. In Fig. 3 we illustrate one of the ears for the recorder in this engagement, the arm being omitted for the purpose of showing the ears 42 and the slot 41. By elevating the spectacle-frame so as to swing the arm 38 on its horizontal pivot the ear 42 will be elevated out of the slot 41, so as to permit the spectacle-frame to be swung out to one side and permit the other ear to engage said slot. When the spectacle-frame is thus elevated, it is limited

ited in its swinging movements by the pin 43 (see Fig. 4) on the arm 38 and which pin engages one of the notches 44 on the spectacle-frame, as shown. In order to limit the swinging movement of the arm 38, we make use of a depending finger 45, passing through the slot 41 and having a head 46, which engages the under surface of the forward end of the arm 32, as will be understood, Fig. 4. We also make use of an adjusting-screw 47, which passes through the arm 38 and engages the arm 32, so as to regulate the position of the spectacle-frame with respect to the record or blank and secure the proper engagement of the recorder or reproducer therewith. This adjustment is important in commercial machines, since records will be shaved many times, and hence will vary considerably in thickness.

The spectacle-frame 39 is provided with two lugs 48, one of which when the spectacle-frame is in either position of its adjustment will be located immediately over the blank or record. If these lugs were not used, there would be danger of injury to the diaphragms in case the device had been adjusted for use with a very thin record or blank and was then used without readjustment on a much thicker record or blank, since the adjustability of the compensating weight would not be sufficient to accommodate such a difference, and in consequence the entire weight of the spectacle-frame would be imposed on one of the glass diaphragms. When, however, the lugs or stops 48 are used, one or the other will engage the record or blank before the compensating weight has moved to its extreme limit, so as to thereby relieve the diaphragms of any strain. Of course in practice the spectacle-frame should be always adjusted by the screw 47, so as to keep the lugs or stops clear of the recording-surface, and said lugs therefore act as convenient gages from which to determine the extent of adjustment necessary.

A speaking-tube (not shown) is applied to the neck 49, which is carried by the lower end of the arm 38, so that the tube will be always located centrally with respect to the recorder or reproducer, whichever may be in operation. In the reproduction of the work for purposes of verification the speaking-tube may be used for listening purposes, as will be understood.

The arm 32 is formed at one side with a lug 50, in which is mounted the shaft 51 of the repeating mechanism. On the lower end of this shaft 51 is a disk or head 52, which takes under the rod 4 and prevents upward movement of the forward end of the arm 32 when the arm 38 is elevated to simultaneously disengage the recorder or reproducer from the record-surface and the feed-nut 35 from the feed-shaft. The shaft 51 is also provided with a disk 53 thereon, which is located above the rod 4. This disk 53 is formed with a cam 54

thereon, (see Fig. 6,) and the lug 50 is formed with a corresponding cam 55. Normally these cams 54 and 55 are out of line with one another; but by turning shaft 51 to one side or the other by the lever 56 the two cams will engage together and result in the elevation of the arm 32 (see Figs. 8 and 10) to lift the spectacle-frame and feed-nut, respectively. The spring 57 is coiled around the shaft 51 between the lug 50 and the lever 56, so as to force the arm 32 downward when the lever 56 is returned to its normal position. Pivoted to the under side of the disk 53 is a spring-actuated pawl 58, adapted to engage teeth 59, formed on the side of the bar 4. When the lever 56 is moved to the position shown in Fig. 8, the cams 54 and 55 will not only elevate the arm 32 to disengage the feed-nut 35 from the feed-screw, as well as to lift the recorder or reproducer from the record-surface, but immediately after this movement the pawl 58 will engage the teeth 59, so that at the completion of the swinging movement of the lever 56 the entire moving frame, comprising the arm 32, spectacle-frame 39, and frame 31, will be shifted to the extent of a few threads toward the starting position, whereupon the reproducer may be engaged with the record to verify the same. If desired, the arm 56 may be given a number of feed movements, as described, so as to carry the recorder or reproducer back to any point on the record that may be desired. When, however, the arm 56 is moved in the opposite direction, the cams 54 and 55 will elevate the arm 32; but the pawl 58 will be carried away from the teeth 59, (see Fig. 10,) so as to permit the parts to be moved freely back and forth, since the feed-nut 35 will be clear of the feed-screw and the recorder or reproducer will be clear of the record-surface.

Our improved commercial phonograph is provided with a bell 60 of any suitable construction, whose clapper is adapted to be engaged by a small gravity-pawl 61, (see Fig. 3,) carried by the frame 31. By this construction as the spectacle-frame moves toward the rear end of the record-surface the pawl 61 will engage the bell-clapper, so as to move the latter and permit it to be subsequently released as the pawl progresses in its movement. On the return movement by the parts the pawl 61 will ride over the bell-clapper without actuating the same, as will be evident.

If desired, the yoke 18 may be provided on one of its arms with a friction-surface 62, Fig. 5, which engages the pinion 15 when the clutch members are released, so as to impose a frictional resistance to the rotation of the mandrel when the latter is released, and thereby bring it almost instantly to rest. This friction-surface may, however, be omitted, or any other convenient and equivalent arrangement may be adopted.

The general operation of the device has

already been indicated with sufficient fullness to be understood in connection with the description of its several parts, it being understood, of course, that any approved arrangement of recorder and reproducer is used in connection with the spectacle-frame.

Having now described our invention, what we claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In a phonograph, the combination with a mandrel and means for rotating the same, of an end gate offering a bearing for the free end of said mandrel, and a spring-latch for automatically locking the said end gate in a closed position, said latch being capable of being released by outward pressure upon the end gate, substantially as set forth.

2. In a phonograph, the combination with a mandrel and means for rotating the same, of a pivoted end gate offering a bearing for the free end of said mandrel, and means for locking said end gate located between its pivot and the bearing for said mandrel, said means being capable of being released by outward pressure upon the end gate, substantially as set forth.

3. In a phonograph, the combination with a mandrel and means for rotating the same, of a pivoted end gate, a bearing for the free end of said mandrel carried by said end gate at its free end, and means for locking said end gate in a closed position, said means being capable of being released by outward pressure upon the end gate, substantially as set forth.

4. In a phonograph, the combination with a mandrel and means for rotating the same, of a pivoted end gate, a bearing for the free end of said mandrel carried by said end gate at its free end, and a spring-latch located between said bearing and the pivot of said bearing for automatically locking said end gate in a closed position, said latch being capable of being released by outward pressure upon the end gate, substantially as set forth.

5. In a phonograph, the combination with a mandrel-shaft and a mandrel thereon, of a driving-pulley, a stub-shaft carrying said pulley, and which acts as a bearing for one end of said mandrel-shaft, an end gate offering a bearing for the other end of said mandrel-shaft, and connections between said driving-pulley and said mandrel-shaft for rotating the latter, substantially as set forth.

6. In a phonograph, the combination with a mandrel-shaft and a mandrel thereon, of a driving-pulley, a stub-shaft carrying said pulley and which acts as a bearing for one end of said mandrel-shaft, an end gate offering a bearing for the other end of said mandrel-shaft, and clutch connections between said driving-pulley and said mandrel-shaft for rotating the latter, substantially as set forth.

7. In a phonograph, in combination, a driving-shaft, a clutch adapted to transmit power from said shaft, and means for operating said

clutch, said means comprising a rock-shaft, a spring-actuated lever, and means for connecting or disconnecting said lever and rock-shaft, substantially as set forth.

8. In a phonograph, the combination with a mandrel-shaft and mandrel carried thereby, of a rotating driving-pulley, a clutch member connected to the driving-shaft and adapted to engage said driving-pulley, a yoke for operating said clutch member, a vertical shaft carrying said yoke, a rock-shaft, connections between said rock-shaft and said vertical shaft, a beam on said rock-shaft, finger-pieces for actuating said beam, and a spring-actuated lever normally disconnected from said rock-shaft but adapted to be connected therewith, substantially as and for the purposes set forth.

9. In a phonograph, the combination, with a mandrel, of a rod parallel to the axis thereof, a sleeve carried by said rod and movable thereon, a diaphragm-carrier extending forward from said sleeve, and a pointer or index extending forward from another portion of said sleeve and cooperating with a stationary scale, substantially as set forth.

10. In a phonograph, the combination of a mandrel, means for rotating the same, a rod supported in the rear of and parallel to said mandrel, a carriage sleeved on said rod, an arm connected to said carriage, a second rod parallel to and between said first rod and mandrel, and supporting the forward end of said arm, an auxiliary arm horizontally pivoted to said first arm and projecting forward therefrom, and a spectacle-frame pivoted to said auxiliary arm and overhanging said mandrel, substantially as set forth.

11. In a phonograph, the combination of a mandrel, means for rotating the same, a rod supported in the rear of and parallel to said mandrel, a carriage sleeved on said rod, an arm connected to said carriage, a second rod parallel to and between said first rod and mandrel and supporting the forward end of said arm, an auxiliary arm horizontally pivoted to said first arm and projecting forward therefrom, a spectacle-frame pivoted to said auxiliary arm and overhanging said mandrel and means for adjusting the auxiliary arm, substantially as set forth.

12. In a phonograph, the combination of a mandrel, means for rotating the same, a rod supported in the rear of and parallel to said mandrel, a carriage sleeved on said rod, an arm connected to said carriage, a second rod parallel to and between said first rod and mandrel and supporting the forward end of said arm, an auxiliary arm horizontally pivoted to said first arm and projecting forward therefrom, a spectacle-frame pivoted to said auxiliary arm and overhanging said mandrel and a tube-support carried by the auxiliary arm, substantially as set forth.

13. In a phonograph, the combination of a mandrel, means for rotating the same, and a

carriage movable longitudinally of the mandrel, of a main arm connected to said carriage, an auxiliary arm pivoted to the main arm, a spectacle-frame pivoted to the auxiliary arm and a device on the spectacle-frame which is interlocked with the main arm when the spectacle-frame is in operative position and which is released when the auxiliary arm is raised on its pivot, substantially as set forth.

10 14. In a phonograph, the combination with
 2 a mandrel, means for operating the same, and
 a carriage movable longitudinally with respect
 to the mandrel, of an arm connected to said
 carriage, an auxiliary arm horizontally pivoted
 15 thereto, a spectacle-frame pivotally carried
 by the auxiliary arm, and an interlocking
 stop device on the spectacle-frame and first-
 mentioned arm respectively for locking the
 20 spectacle-frame in either of its operative po-
 sitions, substantially as set forth.

15 15. In a phonograph, the combination with
 a mandrel, means for rotating the same and a
 carriage movable longitudinally of the mandrel,
 of a main arm connected to said carriage,
 25 an auxiliary arm pivoted to the main arm, a
 spectacle-frame pivoted to the auxiliary arm,
 and two lugs or ears on the spectacle-frame
 adapted to engage a shoulder or recess in the
 main arm, substantially as set forth.

30 16. In a phonograph, the combination with
 a mandrel, means for rotating the same and a
 carriage movable longitudinally of the mandrel,
 of a main arm connected to said carriage,
 an auxiliary arm pivoted to the main arm, a
 35 spectacle-frame pivoted to the auxiliary arm,
 two lugs or ears on the spectacle-frame adapted
 to engage a shoulder or recess in the main
 arm, and means for limiting the movements
 40 of the auxiliary arm with respect to the main
 arm, substantially as set forth.

17. In a phonograph, the combination with
 a mandrel, means for rotating the same and a
 carriage movable longitudinally of the mandrel,
 of a main arm connected to said carriage,
 45 an auxiliary arm pivoted to the main arm, a
 spectacle-frame pivoted to the auxiliary arm,
 two lugs or ears on the spectacle-frame adapt-

ed to engage a shoulder or recess in the main
 arm, and means for limiting the swinging
 movements of the spectacle-frame, substan- 50
 tially as set forth.

18. In a phonograph, the combination with
 a mandrel, means for rotating the same and a
 carriage movable longitudinally of the mandrel,
 of a main arm connected to said carriage, 55
 a fixed bar for supporting the free end of said
 main arm, a repeating-shaft carried by the
 main arm, and a cam on the repeating-shaft
 for elevating the main arm when the repeat-
 ing-shaft is partly rotated, substantially as 60
 and for the purposes set forth.

19. In a phonograph, the combination with
 a mandrel, means for rotating the same and a
 carriage movable longitudinally of the mandrel,
 of a main arm connected to said carriage, 65
 a fixed bar for supporting the free end of said
 main arm, a repeating-shaft carried by the
 main arm, a cam on the repeating-shaft for
 elevating the main arm when the repeating-
 shaft is partly rotated, and means actuated by 70
 the repeating-shaft for feeding the main arm
 longitudinally after the latter has been ele-
 vated, substantially as set forth.

20. In a phonograph, the combination with
 a mandrel, means for rotating the same and a 75
 carriage movable longitudinally of the mandrel,
 of a main arm connected to said carriage,
 a fixed bar for supporting the free end of said
 main arm, a repeating-shaft carried by the
 main arm, a cam on the repeating-shaft for 80
 elevating the main arm when the repeating-
 shaft is partly rotated, and a pawl connected
 to the repeating-shaft and engaging teeth on
 said bar for feeding the main arm longitudi- 85
 nally after the latter has been elevated, sub-
 stantially as set forth.

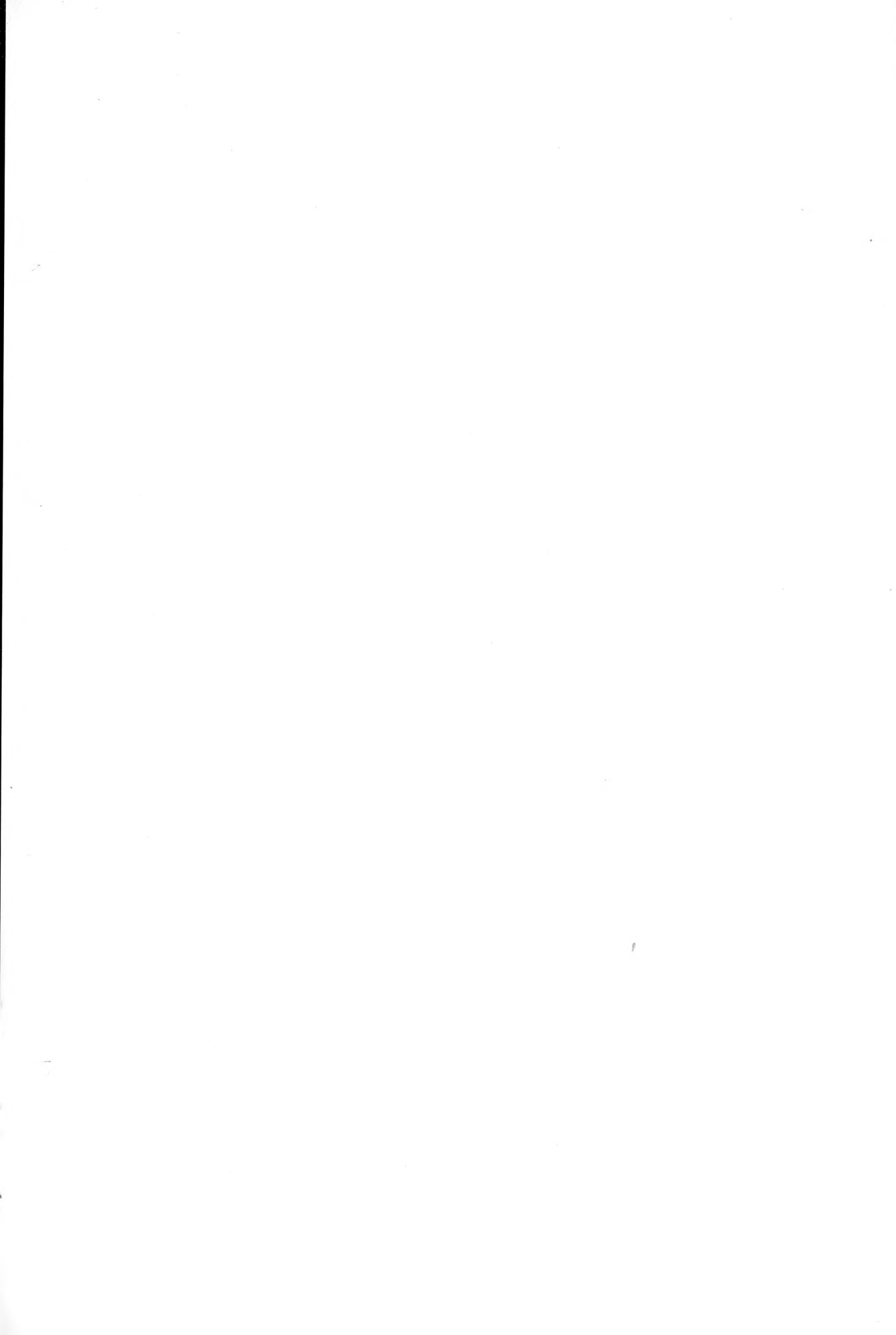
This specification signed and witnessed this
 2d day of September, 1903.

PETER WEBER.
 CHAS. L. HIBBARD.

Witnesses:

FRANK L. DYER,
 WILLIAM A. DOLAN





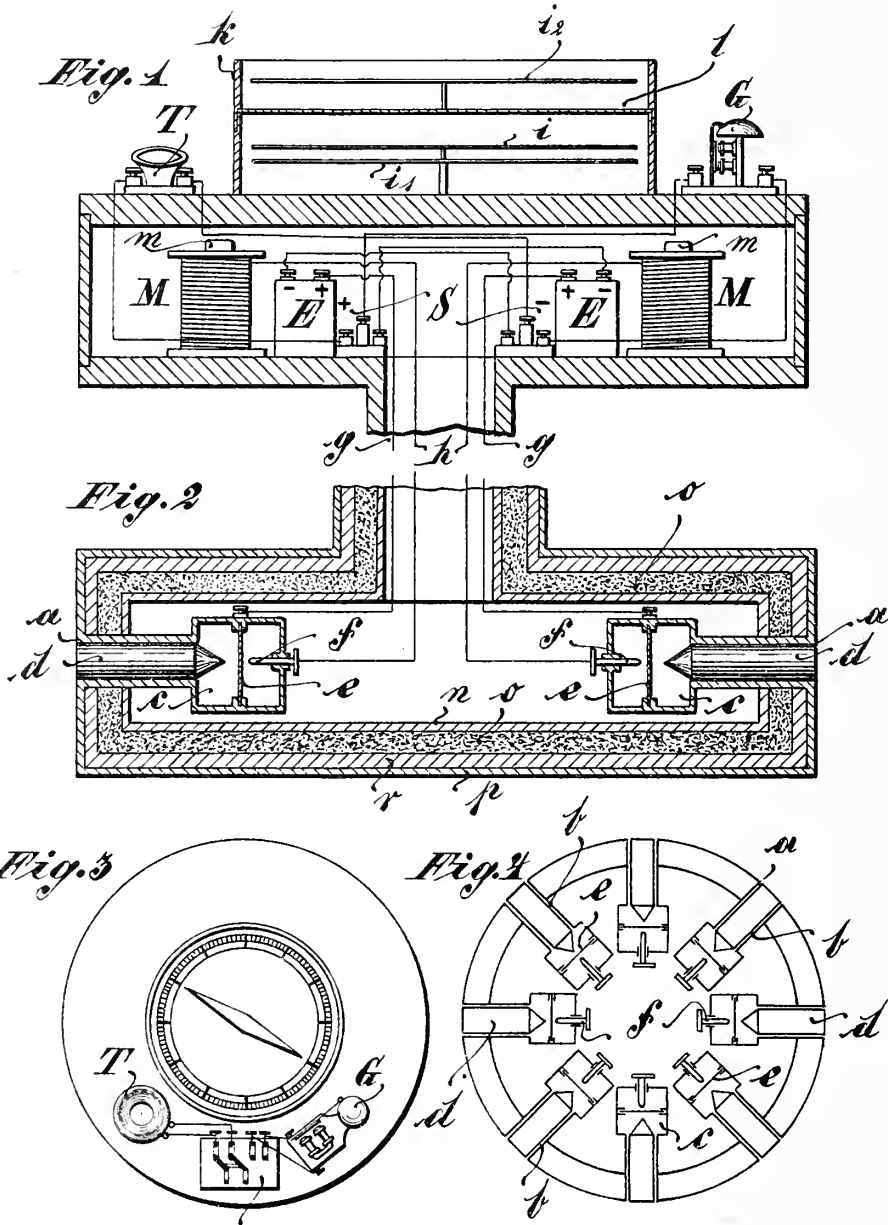
No. 772,676.

PATENTED OCT. 18, 1904.

J. SCHIESSLER.
SOUND INDICATOR FOR VESSELS.

APPLICATION FILED DEC. 26, 1903.

NO MODEL.



WITNESSES:

Paul Lameye.
Albert Nagel.

INVENTOR:

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UNITED STATES PATENT OFFICE.

JOSEF SCHIESSLER, OF VIENNA, AUSTRIA-HUNGARY.

SOUND-INDICATOR FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 772,676, dated October 18, 1904.

Application filed December 26, 1903. Serial No. 186,731. (No model.)

To all whom it may concern:

Be it known that I, JOSEF SCHIESSLER, doctor and scientist, residing at 15 Wimbergergasse, Vienna, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Sound-Indicators for Vessels, of which the following is a specification.

The object of this invention is to catch up and indicate sounds transmitted by and through water and produced, for instance, by the propeller or paddle-wheel of a vessel or by the dead-water of such a one or by the uniform movement of the oars, thus by any one uniform noise lasting some time.

The principal object, however, of the invention is to indicate the direction of movement or the approach of a vessel not yet to be seen, maybe at night or in a fog. The indicator is also intended for use with men-of-war and in connection with the fortifications of harbors, so as to afford a protection against men-of-war and torpedo-boats of the enemy. Also collisions may be prevented by this invention, which is applicable also in the noise of a storm.

The apparatus consists of two main parts, one of which is arranged on deck of ship, whereas the other is submerged into the water and connected with the other main part by means of a tube. The upper main part may be located also in a cabin, but the best position is at the compass of the ship. The submerged part is the sound-receiving device and consists, in the whole, of a polished cylindrical metal casing adapted to resist the action of sea-water. The mantle-surface of this casing is provided with a number of openings arranged like the division of a wind-rose or compass-card, the number of said openings being eight, or sixteen, or more, as desired. The horizontal section through the sound-receiving apparatus shows eight openings with its accessories, whereas in the larger vertical section (shown in Figure 2) only two of the openings with its accessories are visible.

Before proceeding further with the specification I refer to the accompanying drawings, in which—

Fig. 1 is a vertical section through the indicating apparatus. Fig. 2 is a similar section through the sound-receiving apparatus, the

connecting-tube between the two being left away. Fig. 3 is a plan of the middle part of Fig. 1; and Fig. 4 is a horizontal section through Fig. 2, drawn on a smaller scale.

Each of the openings *a*, Figs. 2 and 4, is connected by means of a polished metal tube *b* with a metallic chamber *c* of a cubical shape, as shown. The pipe *b* contains a steel cylinder *d*, of highly elastic material. I prefer to employ steel for the cylinders *d* because steel and iron are the best conductors of sound for the purpose in question. According to the researches of Wertheim the conducting capacity of steel amounts at a temperature of 20° centigrade five thousand and thirty-three meters per second, while sound-waves travel one thousand four hundred and fifty-four meters per second in sea-water and three hundred and thirty-three meters in the open air. Opposite to the pointed inner end of the cylinder *d* is arranged, in the casing *c*, a plate *e*, consisting of a silver alloy and being insulated from said casing. The alloy is prepared with particular attention to a very great elasticity for the reasons which will be more fully explained hereinafter.

Behind the plate *e* is an adjustable pin *f*, also consisting of the alloy in question, the two parts *e* and *f* serving to close an electric circuit in such a manner that the intensity of the current flowing through said circuit may be changed. Owing to this purpose, the contact *e f* may be replaced by a suitable microphone, preferably such in which carbon balls are employed.

The wires *g h*, connected with the contact parts *e f*, extend upward through the connecting-pipe between the sound-receiving apparatus and the indicating apparatus. The latter contains as many galvanic elements *E* and electromagnets *M* as there are contacts *e f* in the submerged apparatus, the arrangement of the parts *E* and *M* being the same as the arrangement of the steel cylinders in the lower apparatus.

Suppose a vessel is plying through the water at a certain distance from the submerged device. The sound-waves generated by the moving vessel are propagated through the water with a velocity of fourteen hundred and

fifty-four meters per second. The sound-waves arriving at one or more of the steel cylinders *d* are transmitted by the same with a still greater speed, and thus the plate or plates *e* are caused to vibrate correspondingly. Each vibration of a plate closes the contact, and thus current is made to pass through the magnet *M*, which has a core *m*, consisting, for instance, of a bundle of thin iron wires or of chemically-pure pulverulent iron inclosed in a glass tube surrounded by the bobbin or coil of the magnet, the object of this arrangement being to prevent the arising of remanent magnetism. Now in consequence of the electromagnet becoming thus excited astatic needles *i* *i'*, inclosed in a casing *k*, are actuated by the respective magnet or magnets. The casing *k* contains also a false bottom *l*, consisting of iron and supporting an ordinary compass-needle *n*. This needle is by the iron bottom *l* protected against the influence of the electromagnet, but the astatic needles are not, and there is thus formed an angle between the needles *i* *i'* and the needle *n*, this angle affording the possibility of reading the direction from which a sound has come. This may be greatly facilitated by combining the needle or needles with a rose in such a manner that an adjustment of one with respect to the other is possible. The circuit contains also a bell *G*, which rings as long as current is passing through that circuit. The circuit contains also a switch *H*, serving to disconnect the latter with a telephone *T*, by means of which the indication of the needles may be controlled and which also allows of ascertaining whether the sound is produced by a propeller, a paddle-wheel, or the like. The telephone permits, further, of judging upon or estimating the speed and direction of the moving vessel. In order to cause the sound-receiving apparatus to catch up only sound-waves coming from a certain definitive direction, the outer surface of the casing is polished, so that disturbing waves are reflected. The base or outer surface of the steel cylinder *d* is plated with platinum and rendered rough, the object of the platinum being to prevent the steel from being attacked by the sea-water and the object of the other means being to cause said surfaces to not reflect the waves arriving at these surfaces.

The casings *c* are inclosed in a common leaden casing *n*, covered with a layer of cotton *o*. Between this layer and the casing *p* of the sound-receiving apparatus is a layer of white firewood *r*, impregnated with paraffin. The space inclosed by the lead casing *n* is filled with hydrogen, or another gas incapable of conducting the sound-waves with the same speed as air would do. A similar effect could be obtained by means of a vacuum. Also the steel cylinder of the sound-pipe is provided with a covering of lead, caoutchouc, or

wood. The isolating-covering extends upward to above the level or surface of the water. In order to prevent the astatic needle from indicating two directions at a time, an odd number of electromagnets is made use of, and each bobbin is surrounded with a mantle of brass to prevent a mutual induction. Each of the electromagnets is further connected with a relay by which another circuit is closed, so as to cause one of a colored series of lamps to glow, and thus to indicate the direction.

As only those sound-waves effect an indication which arrive in a radial direction with respect to the sound-receiving apparatus, the sounds produced by the vessel provided with the apparatus do not cause the closing of a circuit or circuits, and if the apparatus is acted on by several vessels provision may be made to cause the excited magnets to close a separate circuit, causing a separate incandescent lamp provided for said purpose to light up.

The frequency of the contact at the respective disks *e* and pins *f* may also be made use of for the purpose in question, and the whole apparatus may finally be used in the open air to indicate the direction and intensity of sounds, such as produced by a steam-whistle or siren or the like.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination, in a sound-indicator for vessels, of a sound-receiving device adapted to be inserted into water and provided with sound-receivers disposed in radial relation and coöperating with sensitive transmitters, an indicating device arranged above the sound-receiving device, a tube connecting the two devices, electrical circuits between the transmitters of the sound-receiving device and the indicating device, electromagnets included in the circuits, astatic needles arranged for actuation by the electromagnets, and an ordinary compass-needle disposed above and separated from the astatic needles, substantially as described.

2. The combination, in a sound-indicator for vessels, of a sound-receiving device adapted to be inserted into water, an indicating device arranged above the water, a connecting-tube between the two devices, the sound-receiving device having steel cylinders arranged radially therein and adapted to be influenced by the sounds propagated by the water, yielding electrical contacts adapted to be closed by the said cylinders, circuits including the said contacts, and electromagnets excited by the current passing through the circuits, and astatic needles so arranged as to be adapted to be actuated by the electromagnets, substantially as described.

3. The combination, in a sound-indicator for

vessels, of a sound-receiving device adapted to be inserted into water, an indicating device arranged above the water, a tube connecting the two devices, means for catching up the sounds, means for closing electric circuit by the same, electromagnets excited by the current passing through said circuits, and astatic needles so arranged as to be adapted to be actuated by said electromagnets; the sound-receiving device containing a wooden lining impregnated with paraffin, a layer of cotton, and a casing of lead, the latter inclosing the sound-receiving devices proper and the two devices as well as the connecting-tube being filled with hydrogen or an equivalent gas, substantially as described and shown and for the purpose set forth.

4. The combination, in a sound-indicator for vessels, of a sound-receiving device adapted to be inserted into water and having a series of metal cylinders, metallic chambers into which said cylinders project, vibratory plates disposed in said chambers and cooperating with the cylinders, adjustable pins arranged adjacent to the plates, electrical circuits in which the plates and pins are included, an indicating device arranged above the sound-receiving device and connected to the latter by a tube, electromagnets in the indicating device included in said circuits, and astatic needles arranged for actuation by said electromagnets.

5. The combination, in a sound-indicator for vessels, of a sound-receiving device adapted to be inserted into water and having a series of radially-arranged cylindrical means for initially receiving the sound and intensifying transmitters cooperating with said initial receiving means, a sound-indicating device arranged above the water and connected to the sound-receiving device, electric circuits in which the transmitters and electromagnets are included, astatic needles on the sound-indicating device and influenced by the electromagnets, a compass-needle, and a metallic false bottom between the compass-needle and astatic needles.

6. The combination, in a sound-indicator for vessels, of a sound-receiving device adapted to

be inserted into water, an indicating device arranged above the water, a tube connecting the two devices, electric circuits disposed in the sound receiving and indicating devices and having electromagnets included therein, astatic needles arranged to be actuated by said electromagnets, an ordinary compass-needle, and a metallic partition separating the compass and astatic needles.

7. The combination, in a sound-indicator for vessels, of a sound-receiving device adapted to be inserted into water and having an air-tight inclosure with circuit-closing devices cooperating with sound-receiving means, said circuit-closing devices including adjustable contacts and metallic yielding diaphragms, an indicating device having electromagnets therein and connected to the sound-receiving device, the indicating device also having astatic and compass needles disposed therein and separated from each other, and electric circuits between the parts of the sound receiving and indicating devices.

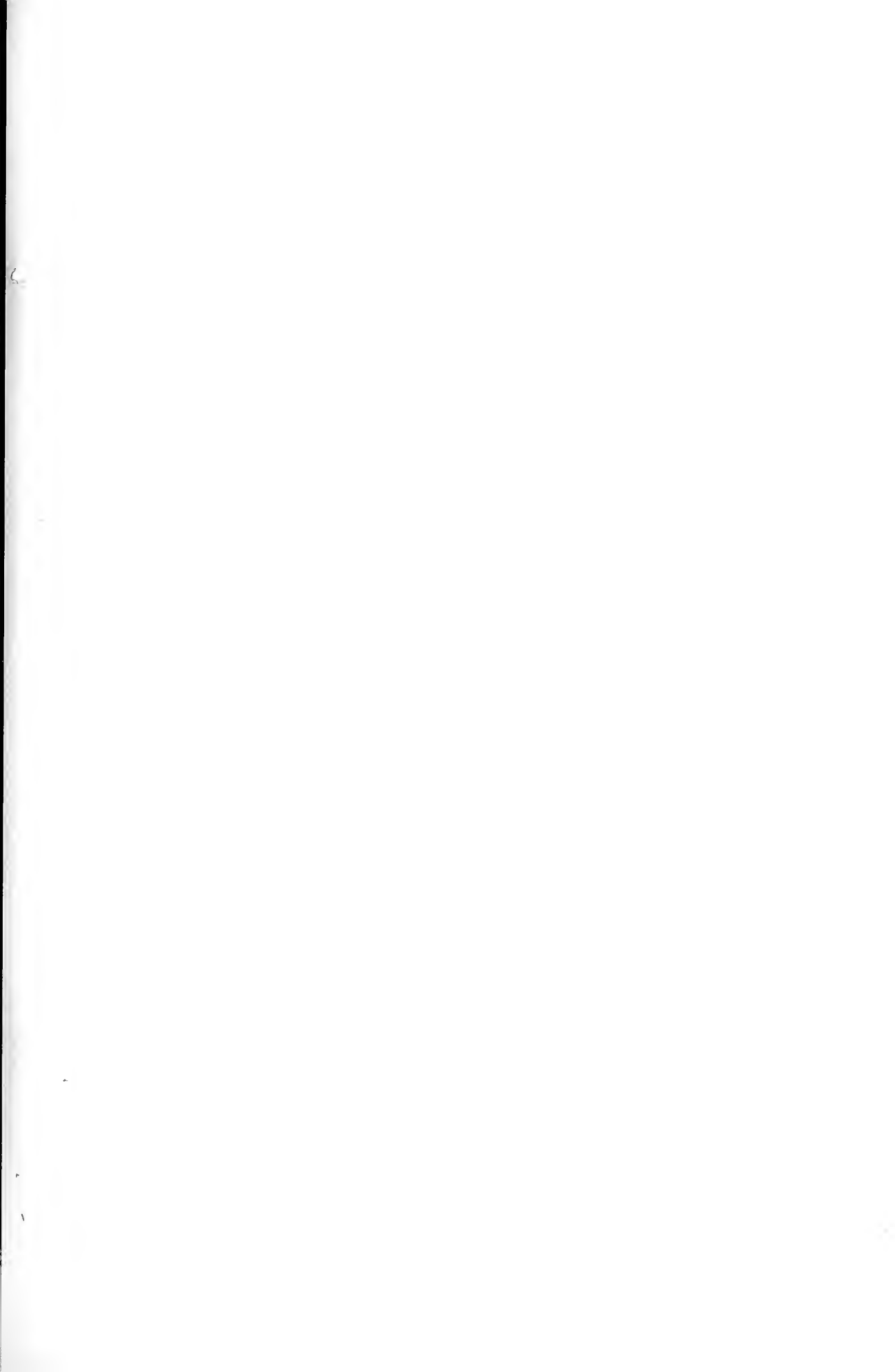
8. The combination, in a sound-indicator for vessels, of a sound-receiving device adapted to be inserted into water and having a series of radially-arranged cylinders, metal cylinders arranged in said cylinders, metallic chambers into which the cylinders project, said chambers having yielding plates therein with which adjusting-pins cooperate, the said plates being formed of silver alloy, an indicating device arranged above the water, a tube connecting the sound receiving and indicating devices, electromagnets disposed in the sound-indicating device, electric circuits including the chambers and electromagnets, and astatic and compass needles on the indicating device, the astatic needles being influenced by the electromagnets, the circuits also including audible and visual signal devices.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

JOSEF SCHIESSLER.

Witnesses:

ALVESTO S. HOGUE,
AUGUST FUGGER.



No. 772,938.

PATENTED OCT. 25, 1904.

D. HIGHAM.
PHONOGRAPH REPRODUCER APPARATUS.

APPLICATION FILED FEB 18, 1904.

NO MODEL.

Fig. 1

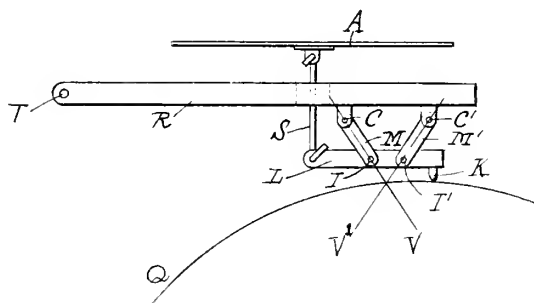
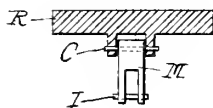


Fig. 2.



WITNESSES

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ATTORNEYS

UNITED STATES PATENT OFFICE.

DANIEL HIGHAM, OF WINTHROP, MASSACHUSETTS.

PHONOGRAPH REPRODUCER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 772,938, dated October 25, 1904.

Application filed February 18, 1904. Serial No. 194,221. (No model.)

To all whom it may concern:

Be it known that I, DANIEL HIGHAM, a citizen of the United States of America, residing in Winthrop, in the county of Suffolk, State of Massachusetts, have invented Improvements in Phonograph Reproducer Apparatus, of which the following is a specification.

This invention relates to phonograph-reproducers as distinguished from gramophone-reproducers.

The object of the invention is to provide a construction in which sound-wave vibrations can be correctly reproduced at the diaphragm, and this is accomplished by the provision of means whereby the point of fulcrum of the stylus-lever can be made to act at or near the surface of the recorded tablet.

In the accompanying drawings, Figure 1 diagrammatically illustrates the invention, and Fig. 2 shows a portion in another view and partly in section.

L is a lever-arm carrying a stylus K, and R a retarding-weight hinged at T, while A is a diaphragm, and S a link passing through a hole (indicated by dotted lines) in the retarding-weight R to connect the lever-arm L to the diaphragm A, all of which are elements well known in phonograph-reproducers.

The parts constituting this invention are shown as consisting of two links M and M', connected to the lever-arm L by pivots I and I', respectively, and to the retarding-weight R by pivots C and C'. The line of the surface of a recorded tablet is indicated at Q, while lines V and V' drawn through the respective pivotal centers of the links M and M' are shown to indicate the line of links M and M' and the angle of the links M and M' with reference to each other. In Fig. 2 the link M and pivots C and I are shown in another view, with a cross-section of the retarding-weight R.

The operation of this construction is similar to that of other well-known phonograph-reproducers, except that the lever-arm L is made to rock upon pivots I and I', and in consequence to swing links M and M' upon pivots C and C' with every vibrating movement corresponding to sound-waves imparted to the lever-arm L through stylus K by the recorded tablet. Thereby a resultant fulcrum

for the lever-arm L (the word "fulcrum" meaning the point about which the lever-arm rocks) is produced at a point where the lines V and V' extended cross each other. From this it will be seen and understood that in the operation of this invention the lever-arm L is made to rock about a point of fulcrum at or near the surface of the recorded tablet, as indicated in Fig. 1, where the line Q and lines V and V' are shown as crossing each other.

The point at which the extended lines V and V' of links M and M' should cross each other has been found to vary slightly with recorded tablets made by different makers. With some tablets the best results are obtained when the point of fulcrum is slightly below the surface of the tablet, while with others slightly above.

It will be apparent that modifications of the precise arrangement shown may be made without departing from the scope of this invention.

I claim as my invention—

1. In a phonograph-reproducer, a lever-arm carrying a stylus, a retarding-weight, and a diaphragm having mechanical connection to said lever-arm, in combination with two links, pivoted to said retarding-weight at two points, and said links being pivoted to said lever-arm at two points, with the links at such angle to each other that the extended lines of said links cross each other at or near the surface of the tablet, substantially as set forth.

2. In a phonograph-reproducer, a diaphragm, a lever-arm carrying a stylus at one end and having mechanical connection to the diaphragm at the other end, in combination with links M and M', pivots C and C' upon which the links are free to swing, pivots I, I' connecting said links to said lever-arm, the links being at such angle to each other that the extended lines of said links cross each other at or near the surface of the tablet, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL HIGHAM.

Witnesses:

A. K. HOOD,
C. L. BAKER.



No. 773,164.

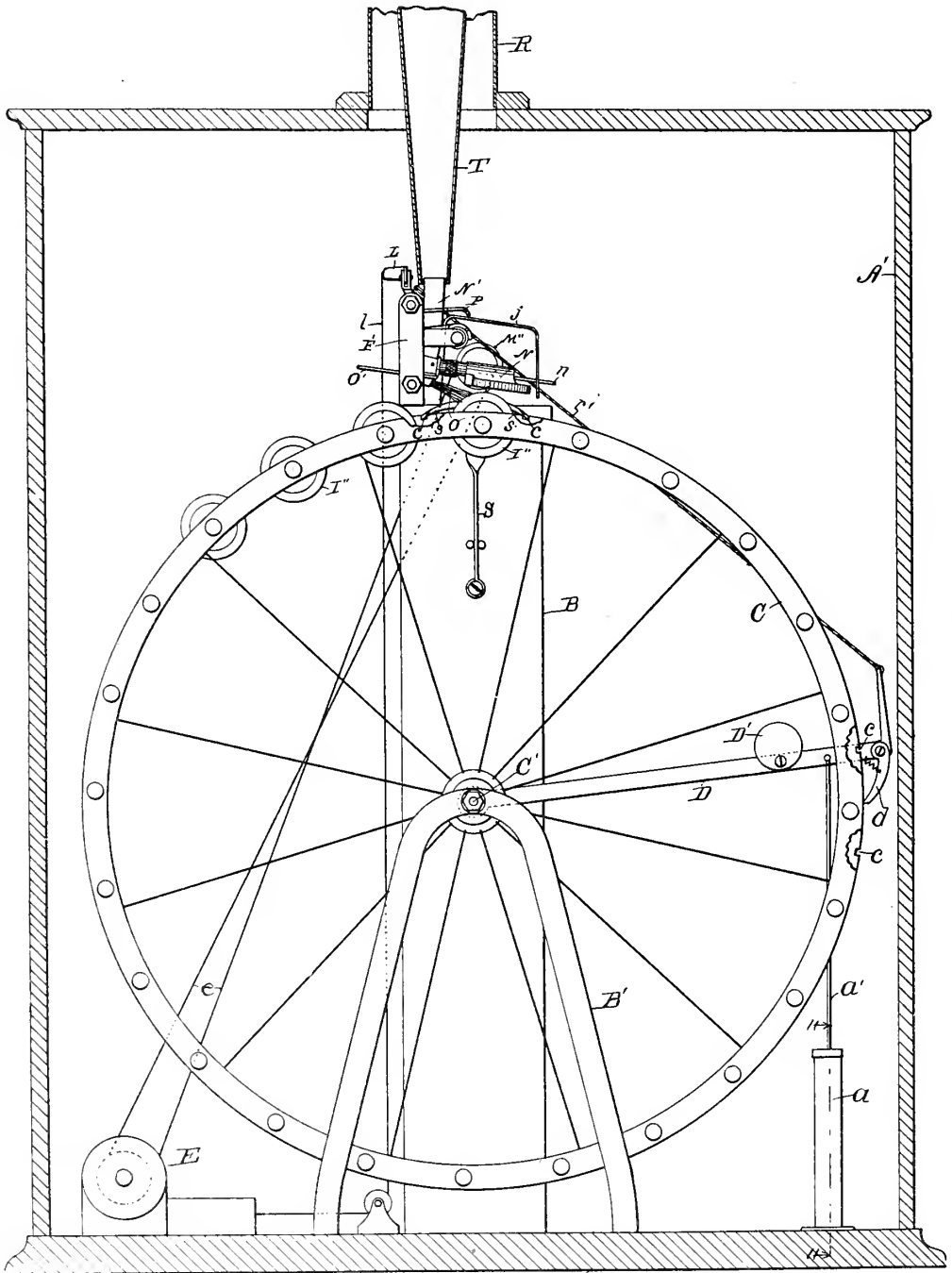
PATENTED OCT. 25, 1904.

C. C. SHIGLEY.
PHONOGRAPH.

APPLICATION FILED JULY 10, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses:

Estel A. Zeller
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Fig 1

A

Inventor,

C. C. Shigley
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Att'y.

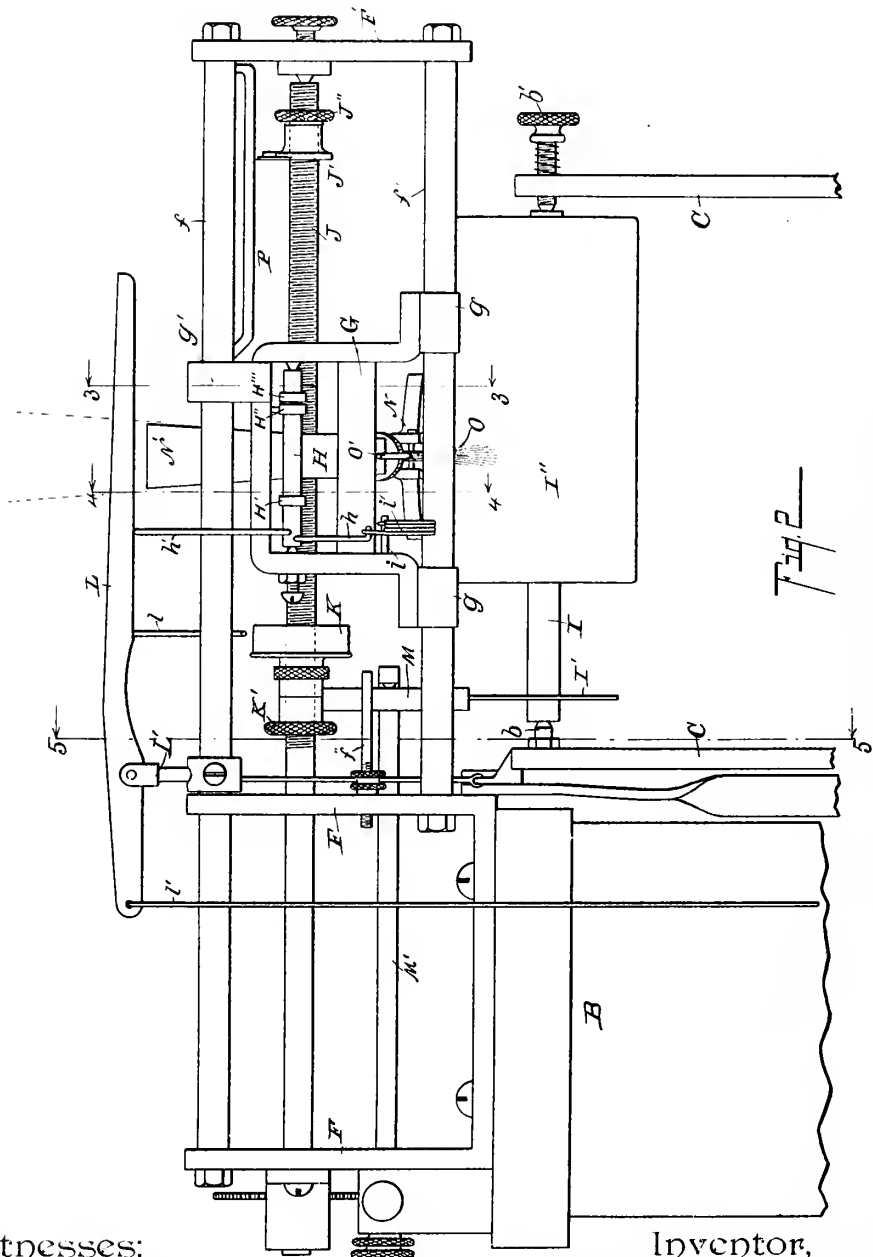


C. C. SHIGLEY.
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APPLICATION FILED JULY 10, 1903.

NO MODEL.

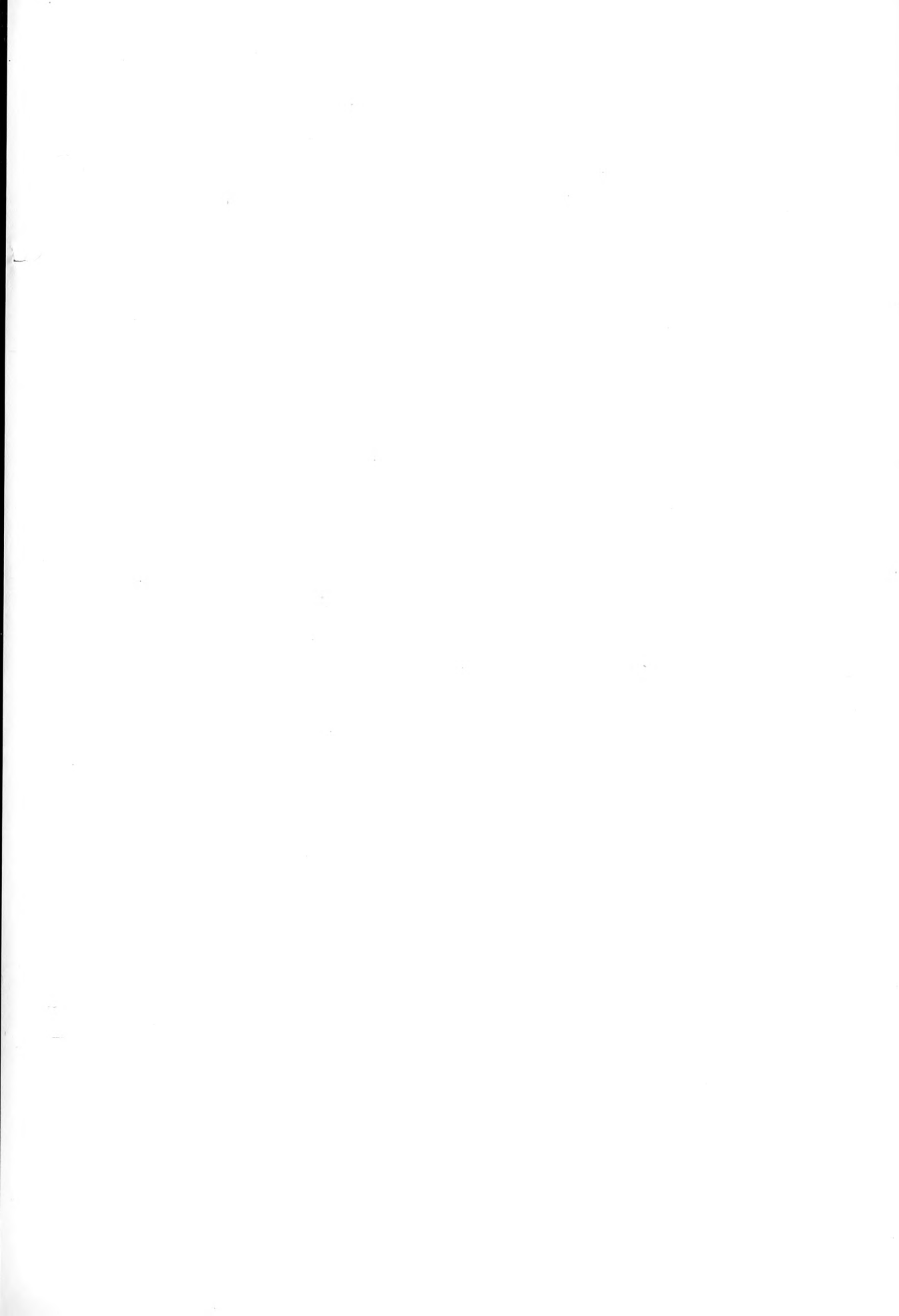
4 SHEETS—SHEET 2.



773,164

Witnesses:
Estel A. Teller
Otis A. Earl

Inventor,
C. C. Shigley
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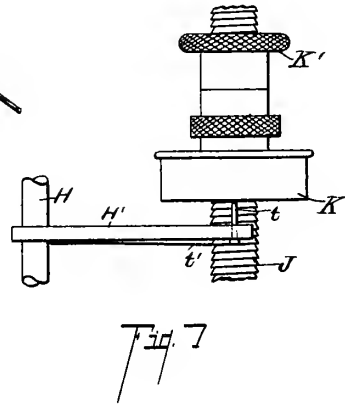
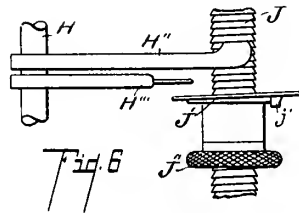
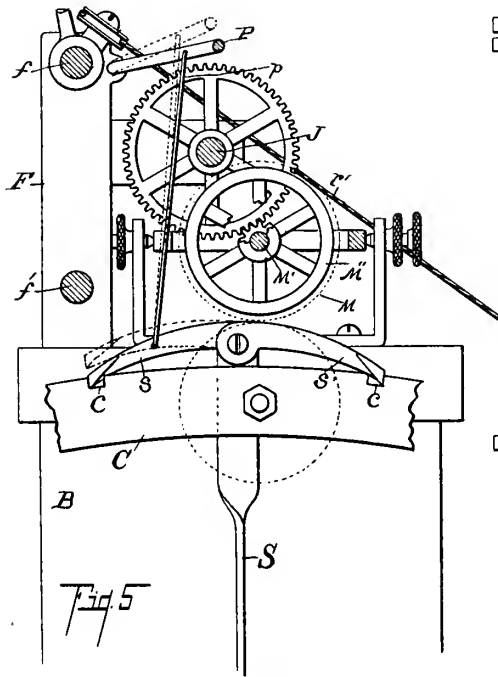
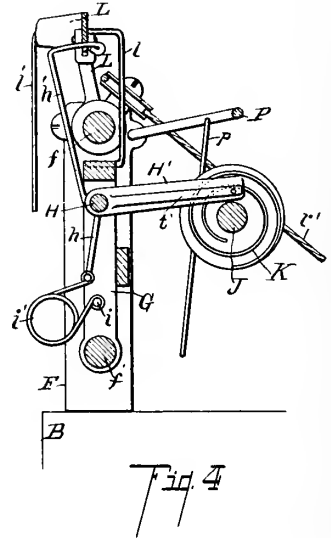
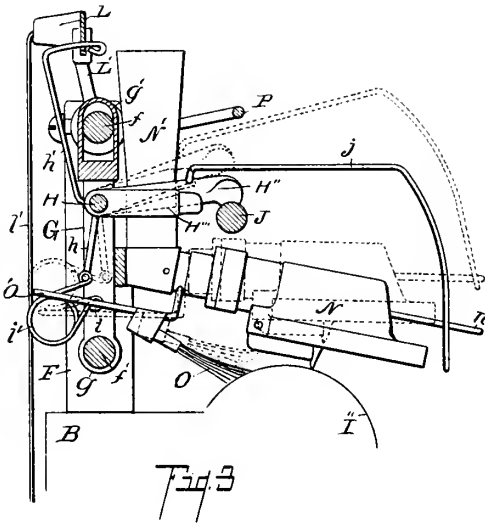


C. C. SHIGLEY.
PHONOGRAPH.

APPLICATION FILED JULY 10, 1903.

NO MODEL.

4 SHEETS—SHEET 3.

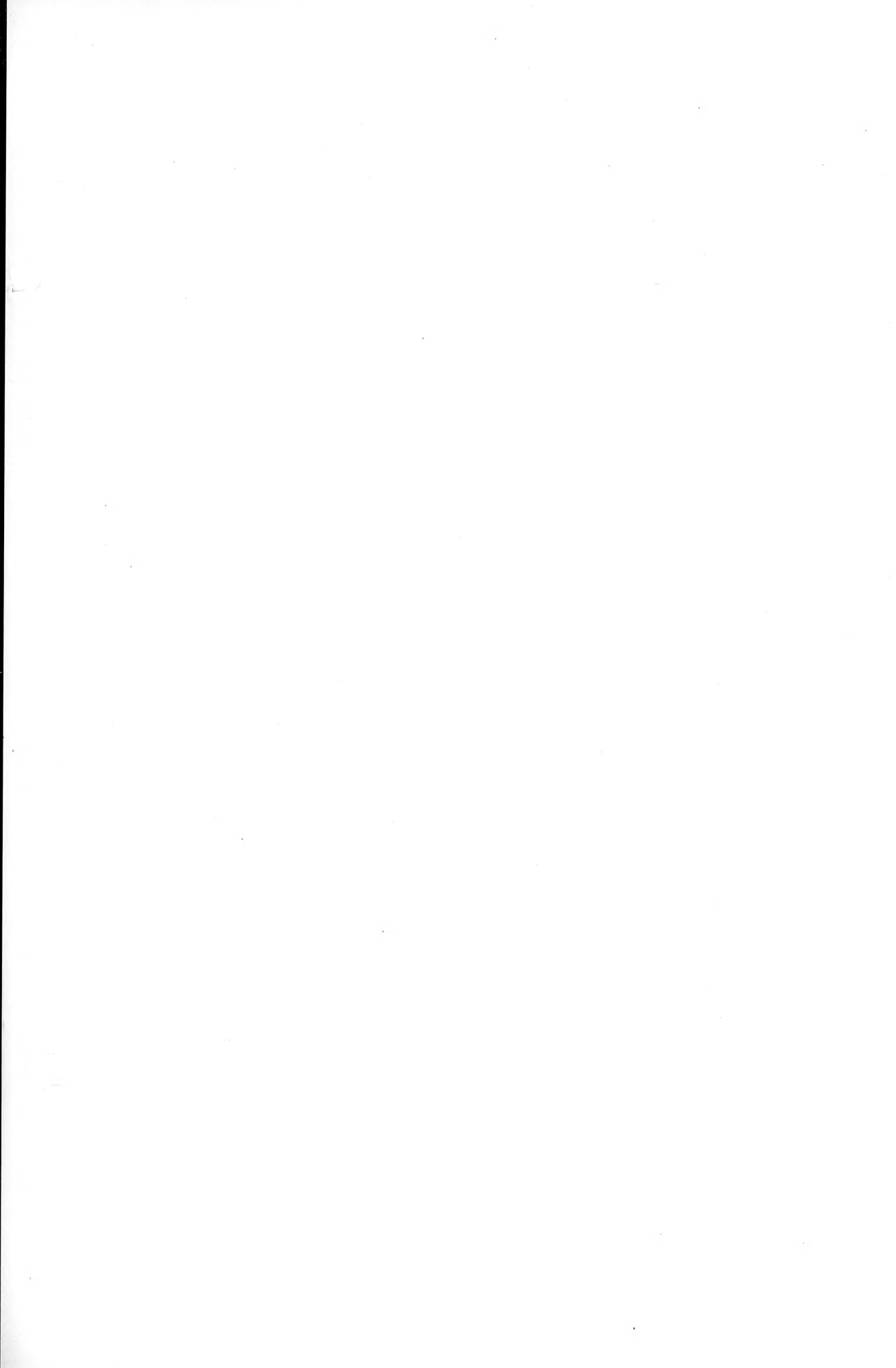


Witnesses:

Arthur A. Jeller
Oliver W. Earl

Inventor,

Cyrus C. Shigley
By *Fred L. Coppell*
Att'y.

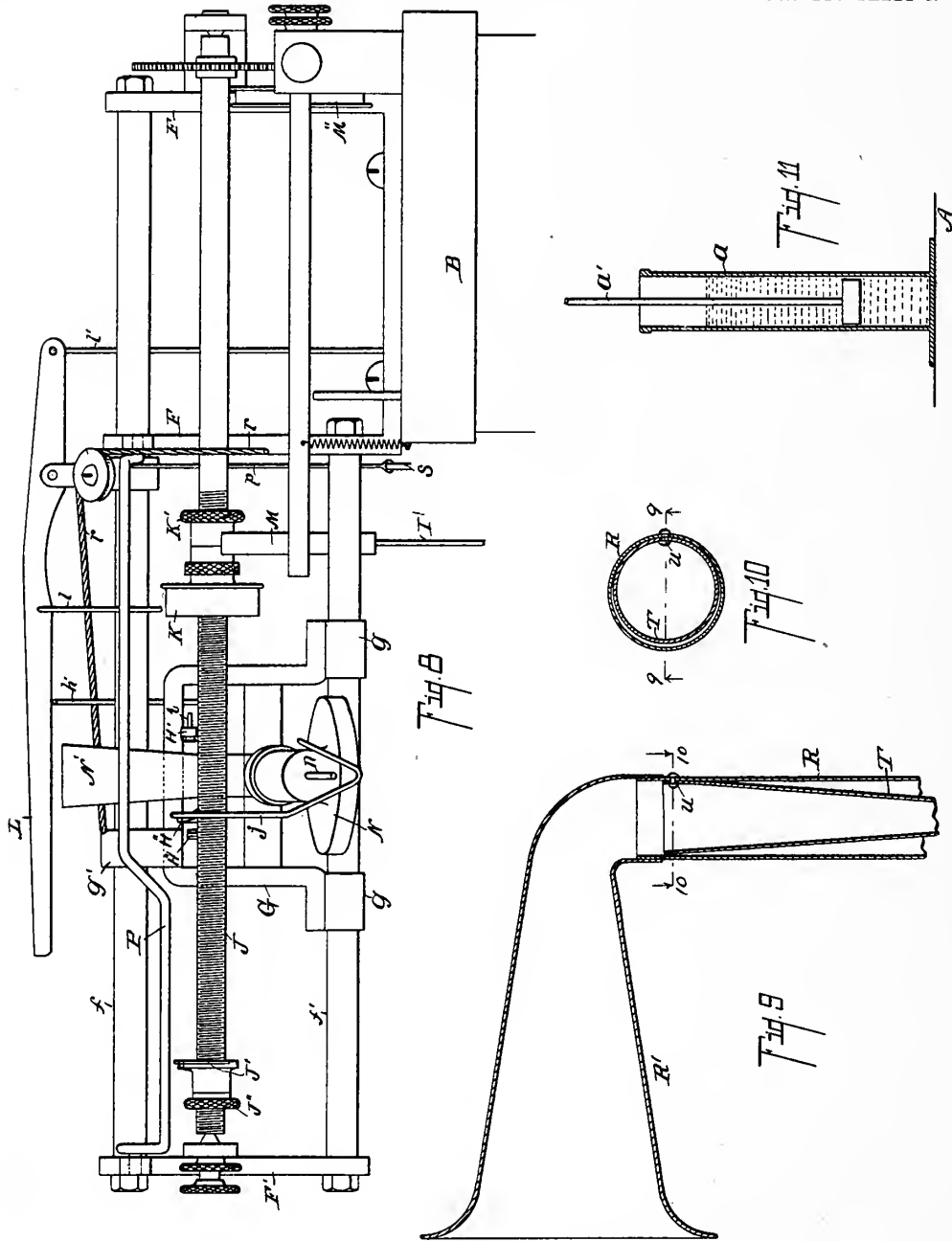


C. C. SHIGLEY.
PHONOGRAPH.

APPLICATION FILED JULY 10, 1903.

NO MODEL.

4 SHEETS—SHEET 4.



Witnesses:

Carl A. Keller
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By *Fred L. Cappell*
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UNITED STATES PATENT OFFICE.

CYRUS C. SHIGLEY, OF HART, MICHIGAN.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 773,164, dated October 25, 1904.

Application filed July 10, 1903. Serial No. 164,955. (No model.)

To all whom it may concern:

Be it known that I, CYRUS C. SHIGLEY, a citizen of the United States, residing at the village of Hart, in the county of Oceana and State of Michigan, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to improvements in phonographs.

It relates particularly to improvements in magazine-phonographs of the class illustrated and described in United States Letters Patent issued to me on May 5, 1903, No. 727,002, and is in some respects an improvement thereon, though it contains features adapted to any phonograph.

The objects of the invention are, first, to provide in a magazine-phonograph improved means by which the record-rolls are automatically brought into position for the reproduction of the records and the reproducer automatically adjusted; second, to provide in a magazine-phonograph improved means by which any desired record may be brought into position for reproduction or the several records reproduced in series automatically, as desired; third, to provide in a magazine-phonograph improved means by which the reproducing mechanism is automatically brought into or thrown out of engagement with the record-roll; fourth, to provide in a magazine-phonograph improved means by which the magazine and the reproducer mechanism are connected to be actuated in proper relation to each other; fifth, to provide in a magazine-phonograph improved means to hold a large number of records which is simple to adjust and not likely to get out of repair; sixth, to provide in a magazine-phonograph an improved carriage and delivery-horn.

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accom-

panying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation view of my improved phonograph, the casing being shown in section and portions being broken away to show details of construction. Fig. 2 is an enlarged rear elevation of the reproducer mechanism and its supporting and operating parts and connection to the magazine. Fig. 3 is a detail sectional view taken on line 3 3 of Fig. 2, showing the carriage and actuating means. Fig. 4 is a detail sectional view taken on line 4 4 of Fig. 2, showing the means for throwing the carriage into connection with the screw. Fig. 5 is a detail sectional view taken on line 5 5 of Fig. 2, showing details of the connection from the carriage to the magazine. Fig. 6 is an enlarged detail plan view of the releasing mechanism for the driving-screw of the reproducer. Fig. 7 is an enlarged detail plan view of the connecting mechanism for the driving-screw. Fig. 8 is an enlarged detail front elevation of the reproducer supporting and driving mechanism. Fig. 9 is an enlarged longitudinal sectional view, taken on line 9 9 of Fig. 10, through the horn of my improved phonograph. Fig. 10 is an enlarged transverse sectional view taken on line 10 10 of Fig. 9. Fig. 11 is an enlarged longitudinal sectional view, taken on line 11 11 of Fig. 1, through the dash-pot α .

In the drawings all of the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, the casing A is of any desired form or material, preferably glazed. Within the casing A are uprights or standards B B', on which the operative parts of the machine are supported.

The record-rolls are supported by a wheel having a pair of parallel rims C, provided with suitable spokes and a hub adapted to revolve upon the shaft C'. The hub is preferably provided with suitable antifric-tion-bearings. The rims are suitably connected together to retain them in position.

Projecting inwardly from one of the rims

C are suitable bearing-pivots *b*. Thumb-screws *b'*, having pivot-bearings formed on their ends, are inserted through the opposite rim and in conjunction with the pivots *b* form bearings for the mandrel-shafts I of the record-rolls I'. With the parts thus arranged the record-rolls are supported, so that they revolve freely and at the same time are held steadily in position. A large number of record-rolls may thus be supported in a comparatively compact space and be brought into proper relation to the reproducer mechanism as desired. The arrangement of the parts for this purpose will be hereinafter pointed out.

Each of the mandrel-shafts I is provided with a thin-rimmed wheel L', which as the magazine-wheel is revolved to bring the record-rolls into proper relation to the reproducer mechanism is engaged by the friction driving-wheel M'' on the shaft M'. (See Figs. 2 and 5.) The driving-wheel M'' is provided with a soft-rubber tire M, which engages the wheels I' of the mandrel-shafts and drives the same noiselessly and effectively. The shaft M' is provided with a pinion, with which the gear on shaft J meshes. This driving mechanism for the mandrel-rolls is substantially that described in my former patent referred to herein.

On the standard B is a bracket F, on which the reproducer mechanism is supported. The reproducer is carried by a carriage G, which is provided with suitable bearings *g g'*, adapted to reciprocate back and forth on the rods *f f'*, carried by the supporting-bracket F. A cross-piece F' connects the outer ends of the rods *f f'*.

It is desirable that the reproducer mechanism be automatic in its operation in relation to the record-roll, so that it is only necessary to start the mechanism to have any record reproduced and the mechanism automatically adjusted for the next reproduction.

The reproducer N is pivotally supported on the carriage G. The carriage G is driven in one direction by the driving-screw J, which is suitably supported on the bracket F and extends out over the magazine-wheel. The shaft J is connected to the motor E by a suitable belt, as *e*. The motor is illustrated in conventional form.

Carried by the rock-shaft H of the carriage G is a blade-like arm H'', which is adapted to engage the threads of the driving-screw J. As the shaft J is revolved the carriage is driven along thereby against the resistance of the weighted lever D, (see Fig. 1.) which is connected to the carriage by the cord *r'*. The lever D is provided with a suitable weight D' and is adapted to actuate the magazine-wheel C and also to return the carriage to its initial position for the reproduction of a record.

The lever D is provided with a pawl *d* on its outer end adapted to engage the ratchet-teeth *c* on the periphery of the magazine-

wheel. The teeth or notches *c* are spaced one to each record-roll carried by the magazine-wheel, so that upon each actuation of the lever D the magazine-wheel is advanced one step to bring the next succeeding record-roll into proper position for reproduction. A suitable stop or escapement mechanism is provided, which will be described later.

When the carriage reaches its initial position in the reproduction of a record, the driving blade or arm H'' is automatically brought into engagement with the driving-shaft J by the arm H', carried by the rock-shaft H. The arm H' is provided with a laterally-projecting pin *t*, arranged therethrough, which is held yieldingly in position by the spring *t'*. (See Figs. 4 and 7.) When the carriage reaches its initial position, this pin *t* is engaged by the involute threaded disk K on the shaft J, which gradually tilts the rock-shaft H until the arm H'' is brought into engagement with the threads of the driving-shaft, the driving-motor having been started by the introduction of a coin or other suitable means. An adjustable stop *f'''* is provided for the carriage.

When the carriage reaches the end of its movement, the driving-blade H'' is automatically thrown out of engagement with the driving-shaft J by the disk J' on said driving-shaft J, which engages the arm H''' of the rock-shaft H and tilts the rock-shaft, thereby throwing the blade H'' out of engagement with the screw. The disk J' is provided with a projecting pin *j'*, which engages the arm H''' as the disk is revolved. This disk is preferably located at the same angle as the screw-threads of the driving-shaft J, so that the arm H''' readily passes the same and is then engaged by the pin *j'*, as described. These parts are similar to those described in my patent hereinbefore mentioned.

In order that the stylus of the reproducer be brought into contact with the record-roll at the proper point, the involute threaded disk K is made adjustable upon the driving-screw J, a lock-nut K' being provided for retaining it in its adjusted position. The disconnecting-disk J' is also screw-threaded upon the screw-shaft J, so that it may be adjusted to stop the carriage and disengage the reproducer at the proper point. The lock-nut J'' is provided for retaining this disk in its adjusted position. The reproducer N is lifted from the record-roll by the downwardly-depending arm *j*, carried by the driving arm or blade H''. This arm *j* projects forwardly and downwardly to the front of the reproducer and engages a projecting pin *n* on the reproducer, so that when the rock-shaft H is thrown upwardly the reproducer N is lifted, as is indicated by dotted lines in Fig. 3. It is apparent that when the rock-shaft is thrown downwardly at the initial end of the carriage movement the reproducer is brought into contact with the

record-roll. The rock-shaft H is retained in its adjusted position by a spring *z*, one end of which is secured to the carriage by a suitable pin *i* and the other to the end of the depending arm *h* on the rock-shaft H. This spring tends to hold the driving-blade H'' in yielding engagement with the driving-screw J when the spring is thrown to that side of the dead-center and holds the same in the elevated position when the spring is thrown to the opposite side of the dead-center. (See Fig. 3.)

When the rock-shaft is operated by the disconnecting means for the driving-blade of the reproducer-carriage, the upwardly-projecting arm *h'* is withdrawn from under the lever L, which permits the same to fall downwardly and stop the driving-motor, which is illustrated in conventional form at E, Fig. 1. The lever L is pivoted on the bracket L', and the long arm of the lever projects out over the reproducer-carriage in position to be engaged by the arm *h'*, which passes under the same as the rock-shaft H is tilted to bring the driving-blade into engagement with the screw driving-shaft J, as is hereinbefore described.

The short arm of the lever L is connected to the motor by a suitable cord, as *l'*. A depending arm *l* on the lever L is arranged to engage the rod *f* and limit the upward throw of the lever.

To keep the record-rolls free from dust and the debris of wear, I provide a brush O, which is adjusted upon the arm O', carried by the reproducer N. By this arrangement the brush is lifted from the record-roll when the reproducer is disengaged and when the machine is in operation brushes the record-roll in advance of the stylus of the reproducer. Each record-roll is thereby kept clean, which adds very greatly to its durability and also to the durability of the stylus. It also makes the tones more perfect than is otherwise possible.

When the arm H'' is thrown upwardly at the end of the movement, as has been described, the arm *j* is brought into contact with the bail or crank-shaft P, which is thrown upwardly thereby. This bail P is connected to the dog *s* (see Fig. 5) by a link *p*. This upward movement of the bail P disengages the dog *s* from the magazine-wheel C, so that the magazine-wheel may be adjusted to bring any record-roll into position to be reproduced. The dog *s'*, oppositely arranged to the dog *s*, prevents the backward revolution of the magazine-wheel. These dogs are carried upon the free end of the spring S, which is supported on the standard B, so that the magazine-wheel is yieldingly held in its adjusted position and any sudden jars or stops prevented.

With the magazine in this position, the carriage being at the end of its movement, the magazine-wheel can, as before stated, be adjusted to any position and bring any roll desired into position for reproduction. Any suit-

able means can be provided for this purpose, the same not being here illustrated.

Upon the introduction of a coin or its equivalent the motor is started, which revolves the driving-screw J. The disengaging disk J' is flattened or cut away on one side, so that as it is revolved the arm H''' is released and the carriage returned to its initial position by the weighted arm D, as has before been described, and the magazine-wheel is also advanced one step. As the carriage is returned to its initial position the bail P is dropped downwardly, which brings the dog *s* into engagement with the magazine-wheel and prevents the same being revolved more than one step. To further control the movement of the magazine-wheel, I provide a dash-pot *u*, the piston of which is connected by the rod *u'* to the lever D. This avoids any liability of injuring the magazine-wheel or the records by jarring.

The bell of the horn R' of the phonograph is supported upon the pipe R, projecting upwardly from the top of the casing. (See Figs. 1 and 9.) The sound is delivered to the bell of the horn R' by the tube T, which is pivotally supported within the pipe R by the pivot *u*. (See Fig. 9.) The tube T embraces the delivery-pipe N' of the reproducer, so that as the carriage is moved back and forth the tube T is swung upon the supporting-pivot *u*. By this means I secure a yielding connection, so that the carriage may be moved freely, and at the same time a connection which does not in any manner affect the tone produced.

I have illustrated and described my improved magazine-phonograph in the form preferred by me on account of convenience in manufacture and simplicity in operation. I am, however, aware that considerable variations may be made in structural details without departing from my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; a carriage G adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-shaft J with suitable connections to said motor; a rock-shaft H carried by said carriage; an arm H' on said rock-shaft; an involute threaded disk on said screw-shaft adapted to engage said arm H' to throw said rock-shaft forwardly; a blade-like arm H'' adapted to engage said shaft J when said rock-shaft is in its forward position; a disk J' on said shaft J having a portion thereof cut away; an arm H''' on said rock-shaft adapted to engage said disk, whereby said rock-shaft H is thrown backwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the rec-

ord-rolls; a pivoted lever D having a pawl *l* thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; locking-dogs *s s'*; a spring-support S therefor; connections from said rock-shaft to said motor; and driving connections for said record-rolls, all coacting for the purpose specified.

2. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; a carriage G adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-shaft J with suitable connections to said motor; a rock-shaft H carried by said carriage; an arm H' on said rock-shaft; an involute threaded disk on said screw-shaft adapted to engage said arm H' to throw said rock-shaft forwardly; a blade-like arm H'' adapted to engage said shaft J when said rock-shaft H is in its forward position; a disk J' on said shaft J having a portion thereof cut away; an arm H''' on said rock-shaft adapted to engage said disk, whereby said rock-shaft H is thrown backwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls; a pivoted lever D having a pawl *l* thereon adapted to engage said magazine-wheel; connections from said lever to said carriage; a locking-dog *s*; connections from said rock-shaft H to said locking-dog *s*; connections from said rock-shaft to said motor; and driving connections for said record-rolls, all coacting for the purpose specified.

3. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; a carriage G adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a rock-shaft H carried by said carriage; an arm H' on said rock-shaft; an involute threaded disk on said screw-shaft adapted to engage said arm H' to throw said rock-shaft forwardly; a blade-like arm H'' adapted to engage said shaft J when said rock-shaft H is in its forward position; a disk J' on said shaft J having a portion thereof cut away; an arm H''' on said rock-shaft adapted to engage said disk, whereby said rock-shaft H is thrown backwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with said record-rolls; locking-dogs *s s'*; a spring-support S therefor; connections from said rock-shaft H to said locking-dog *s*; connections from said rock-shaft to said motor; and driving connections for said record-rolls, all coacting for the purpose specified.

4. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; a carriage G adapted to reciprocate parallel with said record-

rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-shaft J with suitable connections to said motor; a rock-shaft H carried by said carriage; an arm H' on said rock-shaft; an involute threaded disk on said screw-shaft adapted to engage said arm H' to throw said rock-shaft forwardly; a blade-like arm H'' adapted to engage said shaft J when said rock-shaft H is in its forward position; a disk J' on said shaft J having a portion thereof cut away; an arm H''' on said rock-shaft adapted to engage said disk, whereby said rock-shaft H is thrown backwardly; connections from said reproducer to said rock-shaft, whereby said reproducer is thrown into and out of contact with the record-rolls; a locking-dog *s*; connections from said rock-shaft H to said locking-dog *s*; connections from said rock-shaft to said motor; and driving connections for said record-rolls, all coacting for the purpose specified.

5. In a magazine-phonograph, the combination of a suitable frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for driving said carriage in one direction; means for automatically actuating said rock-shaft at the ends of the movements of said carriage; a lever D having a pawl thereon adapted to engage said magazine-wheel; a dash-pot; suitable connections from the piston of said dash-pot to said lever; connections from said lever to said carriage for returning said carriage to its initial position; a locking-dog for said magazine-wheel; connections from said locking-dog to said rock-shaft; connections from said rock-shaft to the driving means for said carriage, for the purpose specified.

6. In a magazine-phonograph, the combination of a suitable frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for driving said carriage in one direction; means for automatically actuating said rock-shaft at the ends of the movements of said carriage; a lever D having a pawl thereon adapted to engage said magazine-wheel; connections from said lever to said carriage for returning said carriage to its initial position; a locking-dog for said magazine-wheel; connections from said locking-dog to said rock-shaft; and connections from said rock-shaft to the driving means of said carriage, for the purpose specified.

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7. In a magazine-phonograph, the combination of a suitable frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower said reproducer to throw the same into and out of contact with said record-rolls; means for driving said carriage in one direction; means for automatically actuating said rock-shaft at the ends of the movements of said carriage; a lever D having a pawl thereon adapted to engage said magazine-wheel; a dash-pot; suitable connections from the piston of said dash-pot to said lever; connections from said lever to said carriage for returning said carriage to its initial position; connections from said rock-shaft to the driving means for said carriage, for the purpose specified.

8. In a magazine-phonograph, the combination of a suitable frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower said reproducer and throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the ends of the movement of said carriage; a locking-dog for said magazine-wheel; a spring-support therefor; connections from said locking-dog to said rock-shaft; means for actuating said magazine-wheel; connections from said magazine-wheel-actuating means to said carriage, for the purpose specified.

9. In a magazine-phonograph, the combination of a suitable frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage adapted to raise and lower said reproducer and throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the ends of the movement of said carriage; a locking-dog for said magazine-wheel; connections from said locking-dog to said rock-shaft; means for actuating said magazine-wheel; connections from said magazine-wheel-actuating means to said carriage, for the purpose specified.

10. In a magazine-phonograph, the combination of a suitable frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage

adapted to raise and lower said reproducer and throw the same into and out of contact with said record-rolls; means for actuating said carriage; means for automatically actuating said rock-shaft at the ends of the movement of said carriage; a locking-dog for said magazine-wheel; connections from said locking-dog to said rock-shaft; means for actuating said magazine-wheel; means for returning said carriage to its initial position, for the purpose specified.

11. In a magazine-phonograph, the combination of a record-roll; means for driving the same; a carriage G adapted to reciprocate parallel to said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-shaft J with suitable connections to said motor; a rock-shaft H carried by said carriage; an arm H' on said rock-shaft; a yielding pin carried by said arm projecting laterally therefrom; an involute threaded disk K adjustably secured on said screw-shaft J adapted to engage said arm H' and throw said rock-shaft forwardly; a blade-like arm H'' adapted to engage said shaft J when said rock-shaft H is in its forward position; a disk J' adjustably secured on said shaft J having a portion thereof cut away; an arm H''' on said rock-shaft adapted to engage said disk J', whereby said rock-shaft H is thrown to its backward position; connections from said reproducer to said rock-shaft whereby said reproducer is thrown into and out of contact with said record-rolls; and connections from said rock-shaft to said motor, for the purpose specified.

12. In a magazine-phonograph, the combination of a record-roll; means for driving the same; a carriage G adapted to reciprocate parallel to said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-shaft J with suitable connections to said motor; a rock-shaft H carried by said carriage; an arm H' on said rock-shaft; an involute threaded disk K adjustably secured on said screw-shaft J adapted to engage said arm H' and throw said rock-shaft forwardly; a blade-like arm H'' adapted to engage said shaft J when said rock-shaft H is in its forward position; a disk J' adjustably secured on said shaft J having a portion thereof cut away; an arm H''' on said rock-shaft adapted to engage said disk J', whereby said rock-shaft H is thrown to its backward position; connections from said reproducer to said rock-shaft whereby said reproducer is thrown into and out of contact with said record-rolls; and connections from said rock-shaft to said motor, for the purpose specified.

13. In a magazine-phonograph, the combination of a record-roll; means for driving the same; a carriage G adapted to reciprocate parallel to said record-rolls; a phonograph-reproducer pivotally supported on said carriage; a motor; a screw-shaft J with suitable connec-

tions to said motor; a rock-shaft H carried by said carriage; an arm H' on said rock-shaft; an involute threaded disk K adjustably secured on said screw-shaft J adapted to engage said arm H' and throw said rock-shaft forwardly; a blade-like arm H'' adapted to engage said shaft J when said rock-shaft H is in its forward position; a disk J' adjustably secured on said shaft J having a portion thereof cut away; an arm H''' on said rock-shaft adapted to engage said disk J', whereby said rock-shaft H is thrown to its backward position; connections from said reproducer to said rock-shaft whereby said reproducer is thrown into and out of contact with said record-rolls, for the purpose specified.

14. In a magazine-phonograph, the combination of a record-roll; a carriage adapted to reciprocate parallel with said roll; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage; connections from said rock-shaft to said reproducer, whereby said reproducer is thrown into and out of contact with said record-roll by the actuation of said shaft; a brush carried by said carriage and adapted to contact with said record-roll when said reproducer is in contact therewith; means for automatically actuating said rock-shaft at the ends of the movement of said carriage; means for driving said carriage in one direction; and means for automatically returning said carriage to its initial position, for the purpose specified.

15. In a magazine-phonograph, the combination of a record-roll; a carriage adapted to reciprocate parallel with said roll; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft carried by said carriage; connections from said rock-shaft to said reproducer, whereby said reproducer is thrown into and out of contact with said record-roll by the actuation of said shaft; a brush carried by said carriage adapted to contact with said record-roll when said reproducer is in contact therewith; means for automatically actuating said rock-shaft at the ends of the movement of said carriage, for the purpose specified.

16. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the record-roll; a screw-threaded shaft; means for driving said shaft; a blade-like arm on said rock-shaft adapted to engage said screw-threaded shaft when the rock-shaft is in its forward position; an involute threaded disk screw-threaded onto said driving-shaft, whereby the same may be adjusted thereon, adapted to engage said arm to throw said rock-shaft forwardly to bring said reproducer into contact with the record-roll; and a lock-nut for

retaining said disk in its adjusted position, for the purpose specified.

17. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the record-roll; a screw-threaded shaft; means for driving said shaft; a blade-like arm on said rock-shaft adapted to engage said screw-threaded shaft when the rock-shaft is in its forward position; an involute threaded disk screw-threaded onto said driving-shaft, whereby the same may be adjusted thereon, adapted to engage said arm to throw said rock-shaft forwardly to bring said reproducer into contact with the record-roll, for the purpose specified.

18. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a screw-threaded driving-shaft; a blade-like arm on said rock-shaft adapted to engage said screw-threaded driving-shaft when said rock-shaft is in its forward position; a disk threaded onto said rock-shaft whereby the same may be adjusted thereon, adapted to engage said blade and throw it out of engagement with said shaft; and a lock-nut for retaining said disk in its adjusted position, for the purpose specified.

19. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a screw-threaded driving-shaft; a blade-like arm on said rock-shaft adapted to engage said screw-threaded driving-shaft when said rock-shaft is in its forward position; a disk threaded onto said rock-shaft whereby the same may be adjusted thereon, adapted to engage said blade and throw it out of engagement with said shaft, for the purpose specified.

20. In a phonograph, the combination of a suitable frame; a carriage adapted to reciprocate; a phonograph-reproducer carried by said carriage; a projecting delivery-tube for said reproducer; a relatively stationary tube R mounted on said frame; a tube pivotally supported within said tube R, with its inner end arranged upon and movable with the delivery-tube of said reproducer; and a horn-bell mounted on said tube R, for the purpose specified.

21. In a phonograph, the combination of a

suitable frame; a carriage adapted to reciprocate; a phonograph-reproducer carried by said carriage; a projecting delivery-tube for said reproducer; a relatively stationary horn; a tube pivotally supported within said horn, with its inner end arranged upon and movable with the delivery-tube of said reproducer, for the purpose specified.

22. In a phonograph, the combination of a suitable frame; a carriage adapted to reciprocate; a phonograph-reproducer carried by said

carriage; a relatively stationary horn; a tube pivotally supported within said horn, connected to said reproducer and movable therewith, for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

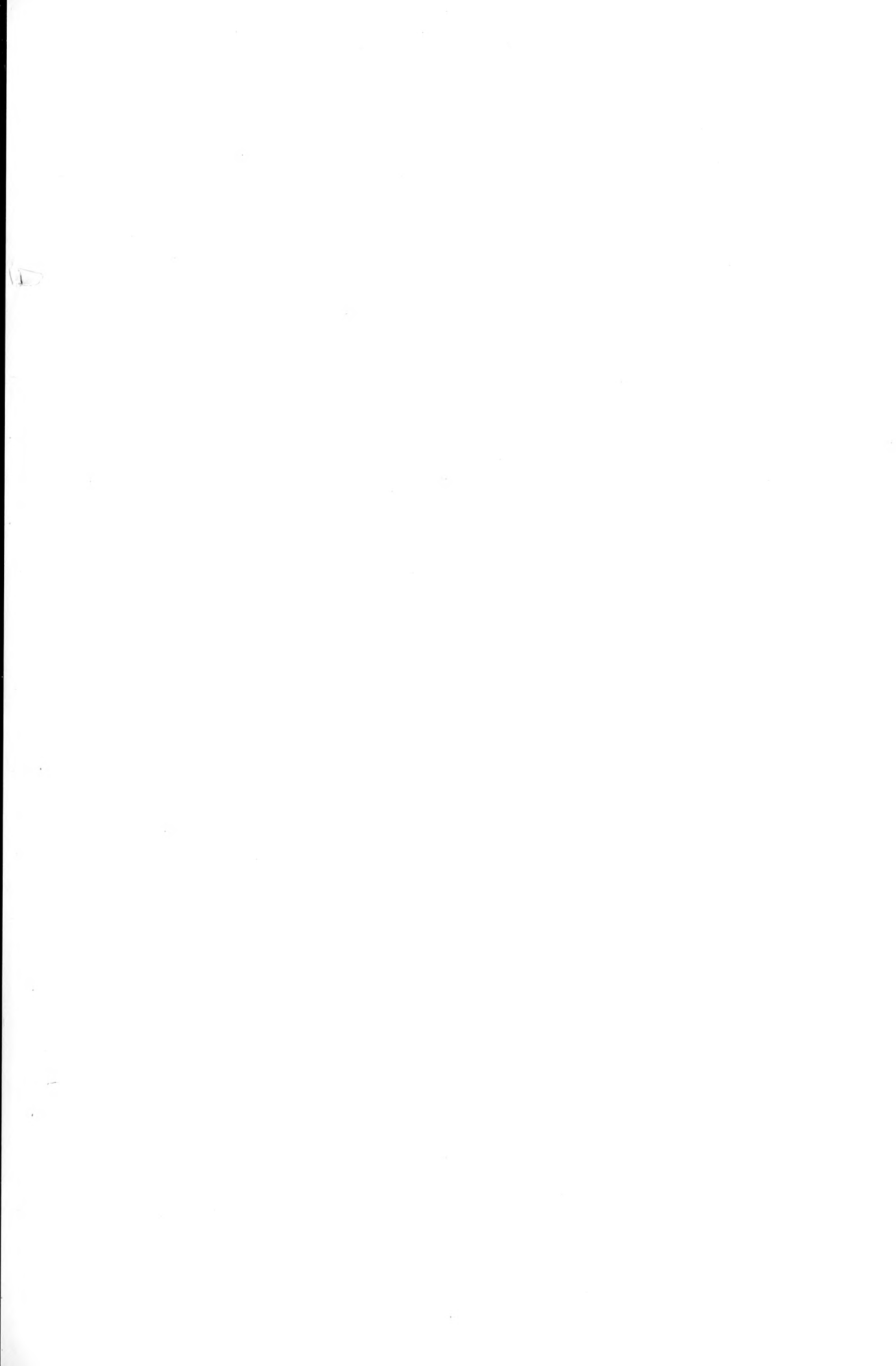
CYRUS C. SHIGLEY. [L. S.]

Witnesses:

CHAS. F. DAYHARSH,
S. H. PAXTON.

15





No. 773,290.

PATENTED OCT. 25, 1904.

E. R. JOHNSON & W. C. MOORE.

TALKING MACHINE.

APPLICATION FILED DEC. 24, 1902.

NO MODEL.

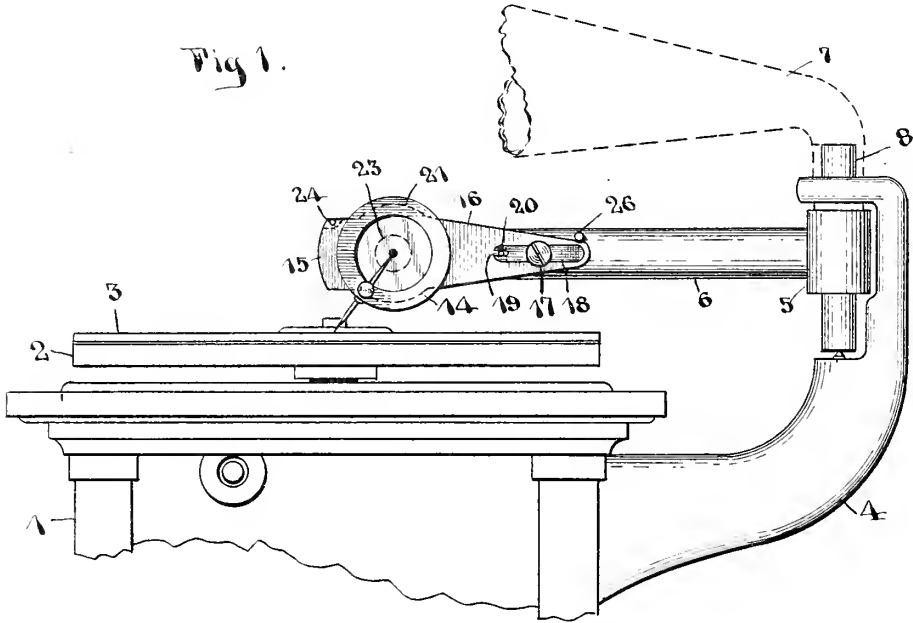


Fig 2.

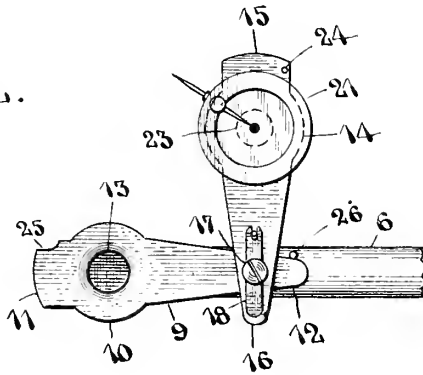
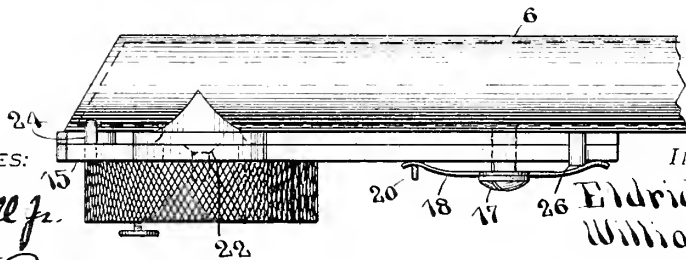


Fig 3.



WITNESSES:

Edw. W. Vaill Jr.

Chas. Bennett

INVENTORS

Eldridge R. Johnson
William C. Moore

by *H. M. T. Ellis*

ATTORNEY:

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON AND WILLIAM C. MOORE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 773,290, dated October 25, 1904.

Application filed December 24, 1902. Serial No. 136,512. (No model.)

To all whom it may concern:

Be it known that we, ELDRIDGE R. JOHNSON and WILLIAM C. MOORE, citizens of the United States, and both residents of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of our invention is the production of an improved connection between the sound-box and the hollow arm of that type of talking-machines known as the "hollow-arm" type. This connection between the sound-box and the hollow arm as attained by our improvement permits a free vertical movement of the sound-box in relation to the record, so that the stylus may follow any unevenness in the record or any inaccurate mounting thereof, and at the same time provides a sound-tight joint between said sound-box and hollow arm, so that sound-waves do not escape at undesirable points, and so lessen the efficiency of the operation of the machine.

Broadly, our invention consists in providing parts upon the hollow arm and upon the sound-box having smooth surfaces of the same form and means for forcing said surfaces in yielding contact with each other.

For a full, clear, and exact description of our invention reference may be had to the following specification and to the accompanying drawings, in which—

Figure 1 is a side elevation of the essential parts of a talking-machine having our improvement in use in connection therewith. Fig. 2 is an elevation of the end of the hollow arm and its attached parts, showing the sound-box in its raised position for inserting or removing a needle from the stylus-bar; and Fig. 3 is a plan view of the end of the hollow arm and its attached parts, the sound-box being in its operative position.

1 indicates the usual motor-casing; 2, the turn-table, which is adapted to be revolved by the motor within the casing 1, and 3 is a sound-record mounted upon the turn-table. A bracket or arm 4 extends from one side of the casing 1 and is curved upwardly to form

a bearing for the hub 5 of the hollow horizontally-swinging arm 6 and also to form a support for the usual amplifying-horn 7. A short tube 8 is fixed in the upper portion of the arm 5 and forms a firm connection between the amplifying-horn 7 and the hub 5. Said hub 5 is hollow and has communication with the hollow arm 6 and with the amplifying-horn 7 through the short tube 8.

Adjacent the hollow arm 6 and upon one side thereof is fixed the elongated plate 9. This plate consists of a main disk portion having extensions 11 and 12 at opposite sides thereof. Said plate 9 is preferably arranged in a vertical position upon the hollow arm and has an opening 13 communicating with the interior thereof. A plate 14, similar to the plate 9 and having corresponding extensions 15 and 16, is pivoted, by means of a screw 17, so as to have sliding contact with the plate 9 and in a parallel vertical plane. Between the head of the screw 17 and the plate 14 is inserted a bow-spring 18, which has sufficient elastic force to keep the plate 14 in yielding but sliding contact with the plate 9, so that the weight of the sound-box and its supporting-plate will keep the needle of the stylus-bar within the groove of the sound-record. A slot 19 is provided in one end of said spring 18, and a pin 20, fixed to the plate 14, enters said slot 19 and holds said spring 18 from movement in relation to the plate 14.

The sound-box 21 is mounted upon the disk portion of the plate 14 and is attached thereto in any suitable manner, such as by screws 22. An opening 23 communicates with the interior of the sound-box and the opening 13 in the plate 9. The edge of the opening 13 is slightly rounded, so that when the opening 23 does not exactly register therewith the sound-waves will be simply deflected into the hollow arm 6 without being hindered in their passage. The extension 15 carries a pin 24, which is adapted to rest upon the extension 11 when the sound-box is in its normal or operative position, a notch 25 being provided in the extension 11 to accommodate the said pin 24. A pin or stop 26 is also provided adjacent the

end of the extension 12 to form a limit to the motion of the plate 14 should the same be carried beyond its vertical position. (Shown in Fig. 2.)

5 It will be seen that our invention provides an extremely efficient and simple means for forming a sound-tight sliding connection between the sound-box support and the end of the hollow arm, there being no delicate or
10 complicated parts to become out of adjustment, the parts being self-adjusting, with no liability of the same being hindered in their movements by reason of unequal expansion, clogging, or other causes.

15 Our improvement is not limited to use with sound-reproducing machines, but may be readily adapted to sound-recording machines with no substantial change in its essential features, and other changes may be made in form and
20 arrangement of parts without departing from the spirit or scope of our invention.

Having thus described our invention, what we claim, and desire to protect by Letters Patent of the United States, is—

25 1. In a talking-machine, a hollow arm limited to swing only in a plane parallel with the record-support, and having a smooth unob-

structed surface at right angles to said record-support, a sound-box, a pivoted support for the sound-box also having a smooth, unob- 30
structed surface corresponding to the surface adjacent the end of the arm, and means for holding said parts in yielding sliding contact, so that said sound-box may be inverted on its
35 pivot.

2. In a talking-machine, a hollow arm limited to swing only in a plane parallel to the record-support, and having a smooth, unob-
40 structed surface at right angles to said record-support, a sound-box, a pivoted support for the sound-box also having a smooth, unob-
structed surface corresponding to the surface adjacent the end of the arm, and a bow-spring
45 carried by the pivot of said support for holding said parts in yielding sliding contact, so that said sound-box may be inverted on its
pivot.

In witness whereof we have hereunto set our hands this 17th day of December, A. D. 1902.

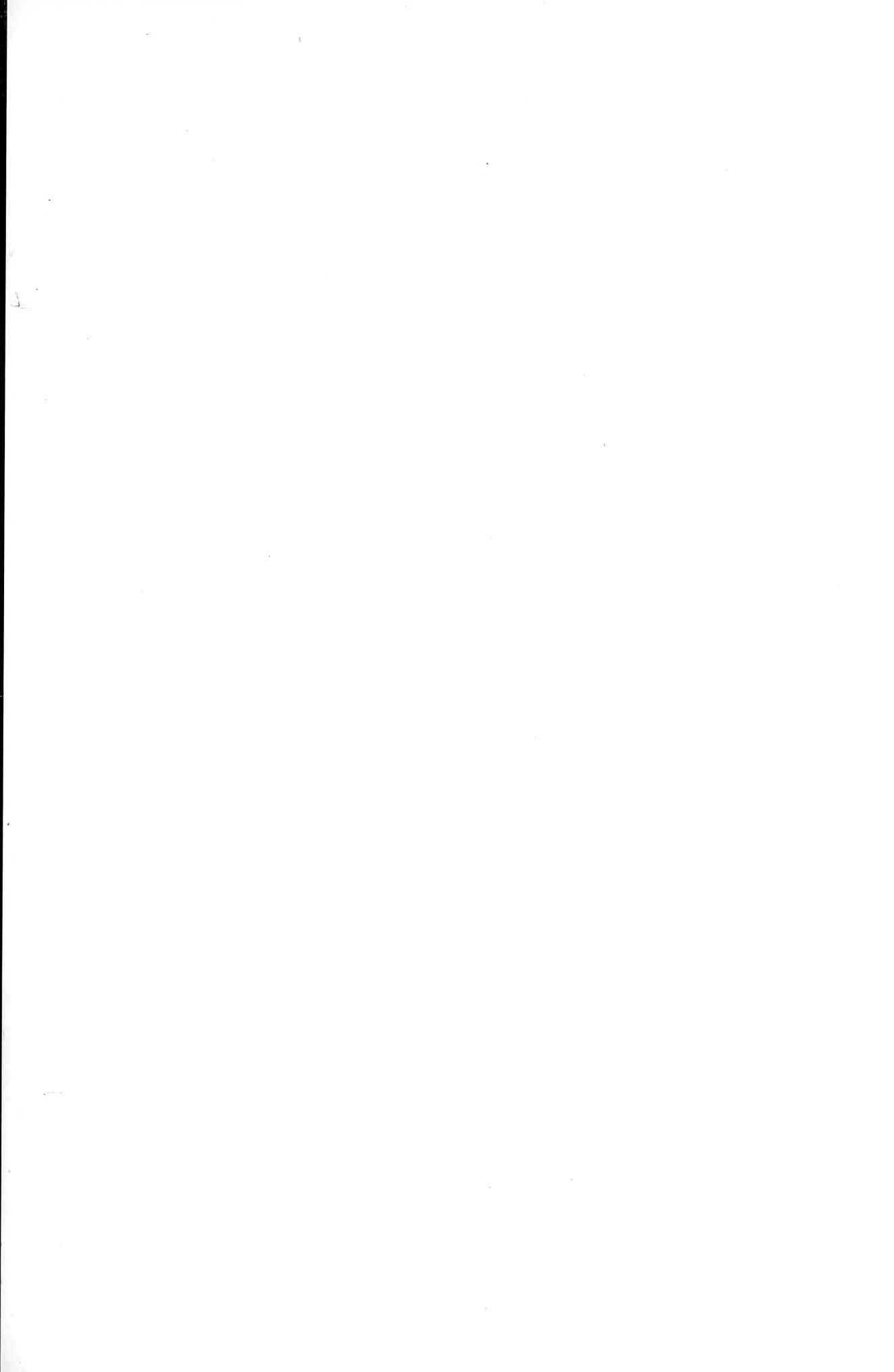
ELDRIDGE R. JOHNSON.

WILLIAM C. MOORE.

Witnesses:

JNO. T. CROSS,

JOHN F. GRADY.



No. 773,304.

PATENTED OCT. 25, 1904.

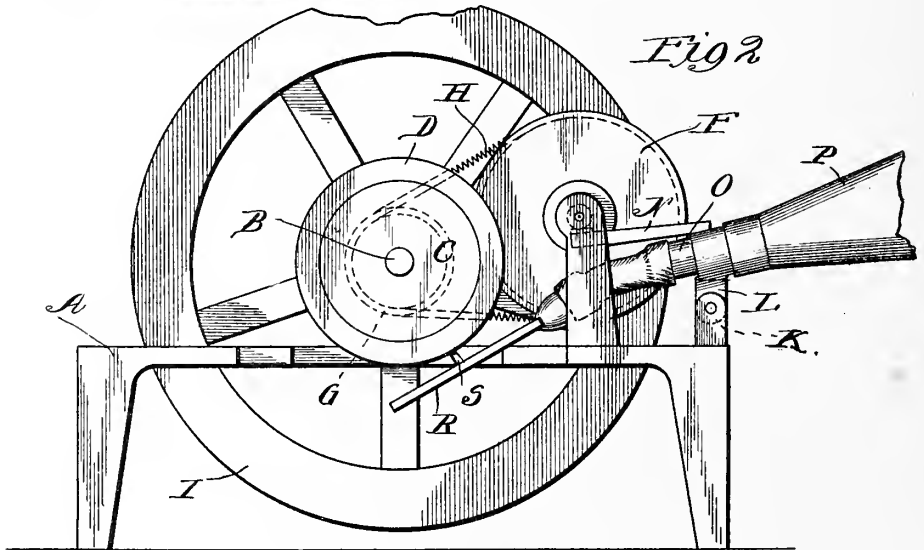
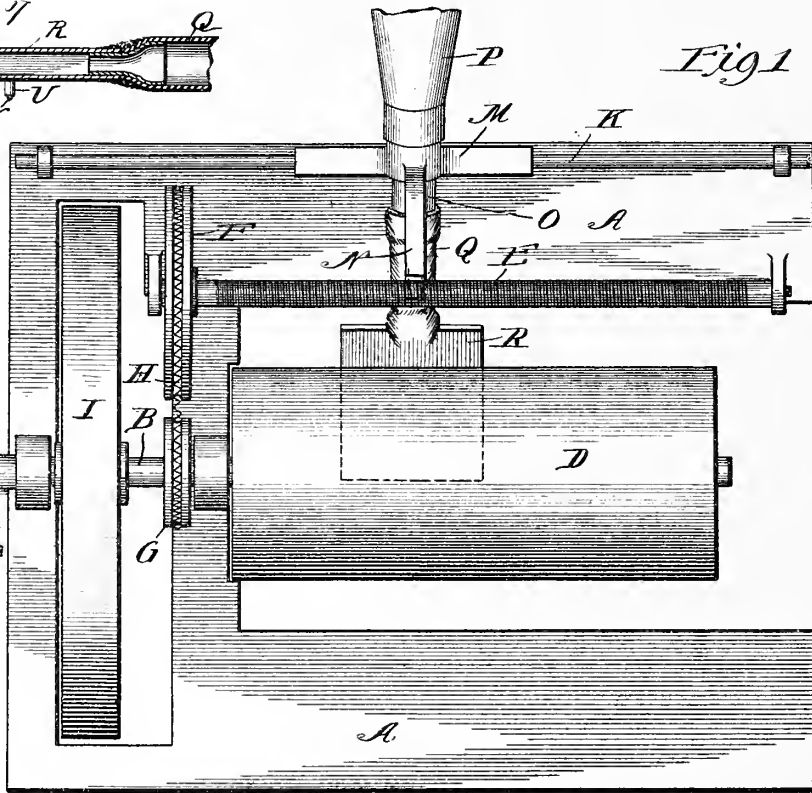
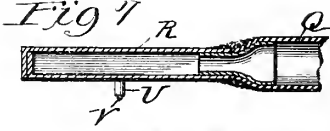
P. E. VAN VALKENBURGH.

PHONOGRAPH.

APPLICATION FILED JUNE 19, 1900.

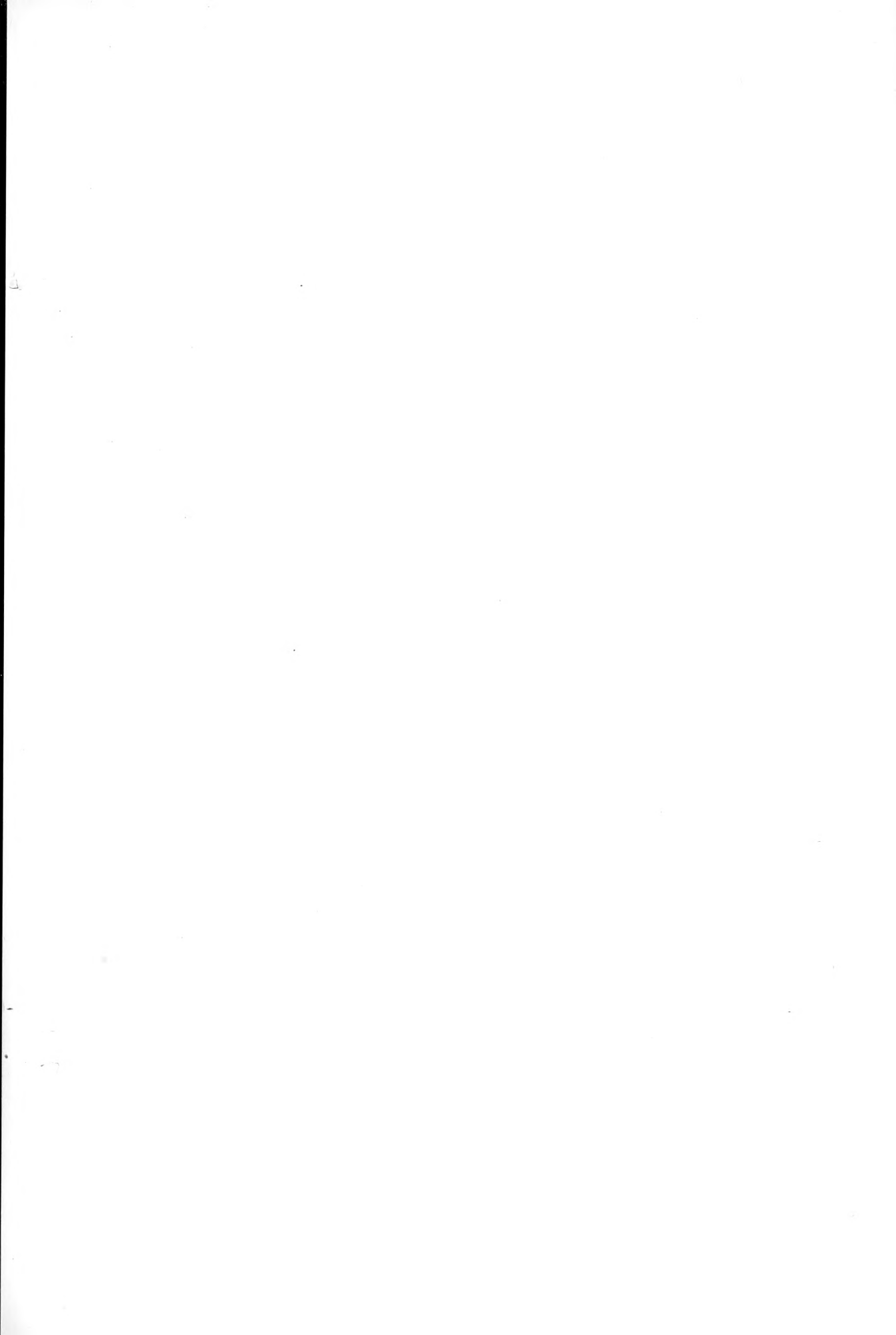
2 SHEETS—SHEET 1.

NO MODEL.



Witnesses
 Ira D. Perry
 J. B. Blair

Inventor
 Paul E. Van Valkenburgh
 By Raymond A. Oushenck
 Attys



No. 773,304.

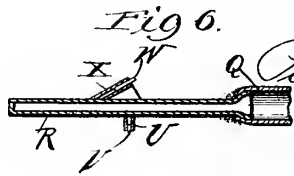
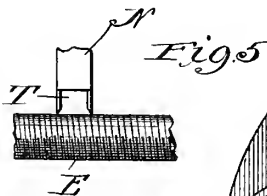
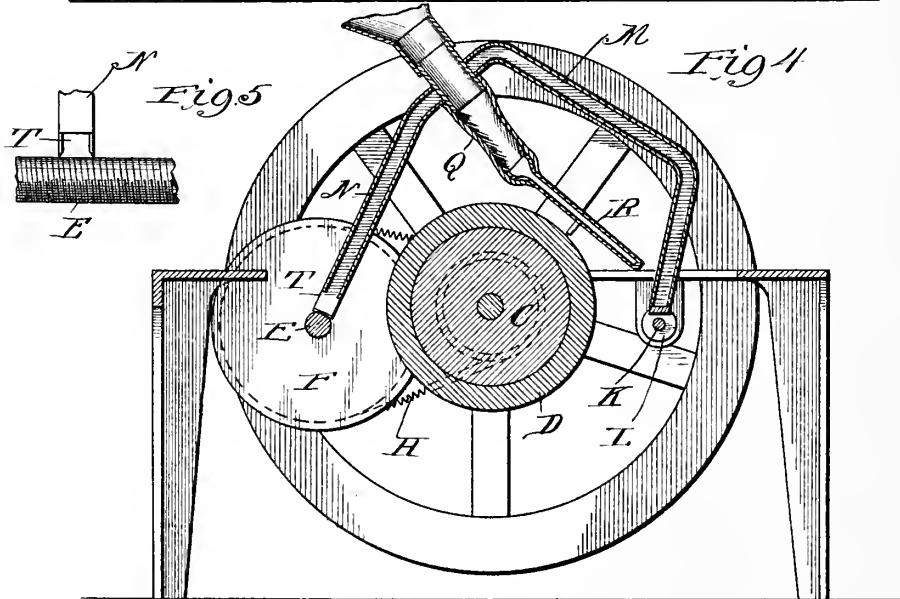
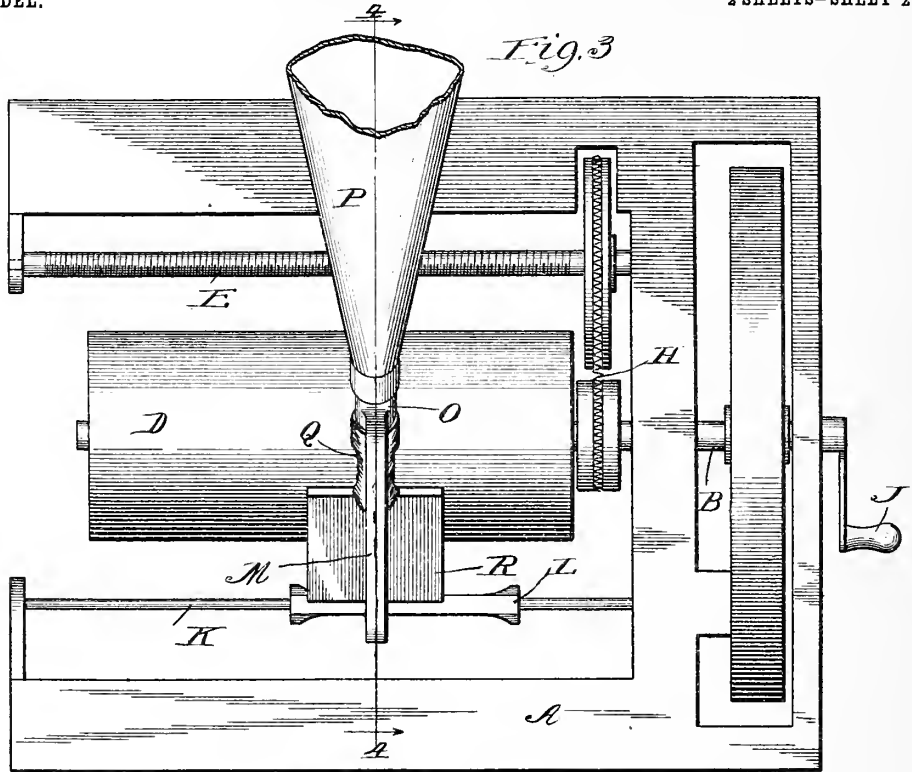
PATENTED OCT. 25, 1904.

P. E. VAN VALKENBURGH.
PHONOGRAPH.

APPLICATION FILED JUNE 19, 1900.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses
Geo. D. Ross
J. B. Blair

Fig. 6.

Inventor
Paul Van Valkenburgh
 By *Raymond P. ...*
Attys

UNITED STATES PATENT OFFICE.

PAUL E. VAN VALKENBURGH, OF CHICAGO, ILLINOIS.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 773,304, dated October 25, 1904.

Application filed June 19, 1900. Serial No. 20,798. (No model.)

To all whom it may concern:

Be it known that I, PAUL E. VAN VALKENBURGH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to improvements in phonographs, and has for its primary object the production of a cheap, simple, and durable instrument that may be operated either by hand or by power.

A further object is to have the recorder and reproducer held in contact with the wax cylinder yieldingly by elastic force as contradistinguished from the force of gravity commonly employed in instruments of this class.

Another object of my invention is to so pivotally mount the feed-arm and the reproducer or recorder that the weight of the horn or other suitable weight aside from the feed-arm or the diaphragm-box may be utilized to hold the feed-arm in operative contact with the feed-shaft and to hold the reproducer or recorder in operative contact with the record or record-blank.

These and such other objects as may hereinafter appear are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 represents a plan view of a phonograph embodying my invention in its preferred form. Fig. 2 represents an end elevation thereof. Fig. 3 represents a plan view of a modified form of phonograph embodying my invention. Fig. 4 is a transverse section on the line 4 4 of Fig. 3. Fig. 5 is a detail view of the feed-screw and its contacting device. Fig. 6 is a detail sectional view of the combined recorder and reproducer, and Fig. 7 is an enlarged detail view more clearly showing the preferred manner of constructing the recorder and reproducer.

Similar letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates the supporting-frame

of the machine, which may be of any suitable shape and construction, but preferably has the form of a rectangular frame with the central portion of one of the end bars cut away so as to leave the frame open at that end. Upon the opposite end bar of the frame is journaled one end of a shaft B, which projects therefrom toward the opposite open end of the frame, substantially midway between the same, and has rigidly mounted thereon a cylinder C, preferably of wood, which tapers slightly from the end thereof adjacent to the supported end of the shaft and is of a diameter to receive the usual wax-composition cylinder D, which is slipped thereon and held by frictional contact in the usual way of machines of this class. This wax cylinder is of course plain when it is desired to record sounds thereon, or it may be in the shape of what is technically called a "record" with the sounds already recorded thereon. With a plain cylinder the recorder is of course used, while with the record the reproducer is used.

Journaled in suitable bearings at one side of the frame A and parallel with the shaft B is a screw-threaded feed-shaft E, having mounted thereon a pulley in line with another pulley G, rigidly mounted upon the main shaft B, said pulleys being connected by a belt of any suitable kind, preferably a small metallic coiled spring H, trained about the two pulleys, so as to communicate power from one to the other. Upon the shaft B and working in the slot cut out of the end bar of the frame is a fly-wheel I for inducing regular motion of the shaft B, to which power is preferably communicated by a crank J, although of course the shaft B may be driven by power in the shape of the usual cheap clockwork mechanism, geared thereto in the ordinary manner. As, however, my primary object is to produce the cheapest possible machine that shall give satisfactory work, I prefer to use the crank, as shown.

Beyond the feed-screw E and extending parallel therewith is a rod K, supported in suitable bearings at the side edge of the frame A, upon which are slidingly mounted depend-

ing ears L from the horn-support M, which latter is provided with a laterally-extending feed-finger N, engaged by a knife-edge on the end thereof with a thread on the feed-screw, so that as the feed-screw is revolved the horn-support will be caused to travel along on the rod K, according to the direction in which the feed-screw is turned. The horn-support carries a transverse tube O, upon one end of which is slipped the horn P, while on the other end is forced one end of a short section of rubber tubing Q, the opposite end of which is attached to the reproducer R, whose tracing-point S engages the record D at the under side thereof, as clearly shown in Fig. 2. It will be noted that the plane of the reproducer is at an angle to the axis of the horn and the tube on the horn-support, this disposition being possible by reason of the interposition between the horn-support and the reproducer of the rubber tubing.

One of the principal points of my invention is that I rely upon the resilience of the rubber tubing to hold the reproducer up to its work against the record, but yieldingly, so as to avoid any damage thereto. As a result of such construction the reproducer may be made exceedingly light, and, in fact, lighter than it would be possible to make one and get the same results where the gravity of the reproducer alone is relied upon to hold it in proper contact with the record. It will also be noted that the weight of the horn P is alone relied upon to hold the feed-arm N in proper contact with the feed-screw, and obviously whenever it is desired to shift the reproducer back and forth to different positions upon the record it is only necessary to lift the outer end of the horn and rock the horn-support upon the rod K, when both the reproducer and the feed-arm will be moved out of contact with the record and feed-screw, leaving all of the parts carried by the horn-support free to be moved back and forth.

The principal difference between the machine illustrated in Figs. 1 and 2 and that illustrated in Figs. 3 and 4 is that in the first-mentioned machine the reproducer opposes the under side of the record or wax cylinder, while in the last-mentioned machine the reproducer opposes the upper side of the record or wax cylinder. Of course there are minor differences in the disposition of the parts rendered necessary by the difference referred to; but in all general features of operation and coöperation the parts are identical. For instance, the guide-rod K for the horn-support is on the opposite side of the record-supporting cylinder and frame from the feed-screw E, and the horn-support N spans the record and has the transverse tube with which the horn P and tube of the reproducer R are connected mounted thereon between the ends of

the support, one end of which is sleeved upon the rod K or provided with ears L, corresponding with those of the construction previously described, while the other end rests directly upon the feed-shaft. Hence it will be seen that in this instance the feed-arm is to all intents and purposes merely a prolongation of the horn-support.

While I have referred to a certain part of the structure as the "horn-support" and have described my device as being so constructed that the recorder or reproducer is held in operative contact with the cylinder by the weight of the horn, it should be understood that any suitable sound-receiving or sound-distributing means may be substituted for the horn. Obviously, also, the device may be so constructed that the weight which I supply by attaching the horn may be provided at the point where I attach the horn by some other part of the structure—as, for instance, by making the horn-support of sufficient weight at the point where the horn is attached to hold the reproducer or recorder against the cylinder in the same manner that I hold them in operative position by means of the weight of the horn—but such variations do not constitute a departure from the spirit of my invention.

Heretofore the engagement between the feed-arm and the feed-shaft has generally been effected by a single knife-edge fitting into the thread on the feed-shaft; but I prefer to have a two-point engagement between the feed-arm and the feed-shaft by providing two parallel adjacent knife-edges upon the end of the feed-arm. This may be readily and economically effected by forming the feed-arm out of square tubing and then cutting away the upper and lower sides thereof for a short distance back of the end of the arm, as clearly illustrated at T in Figs. 4 and 5, thus leaving the sides only of the arm to engage the thread of the feed-shaft at two adjacent points along its length. This serves to steady the horn-support, as well as reducing the liability of jumping the ends of the feed-shaft, and therefore tends to insure a more perfect and regular feed of the reproducer along the record.

Another important and novel feature of my invention made possible by the employment of the elastic or resilient tube connecting it with the horn-support is the reproducer, which in practice I have made out of a small paste-board box, such as are commonly used by druggists for pill-boxes, in one side edge of which I insert a short section of tube adapted to fit into the end of the elastic tube Q, and at the center of the box, on one side thereof, I cement a short post U, in which is set the usual sapphire point V for following the groove in the record. This box serves the

purpose of an amplifying - chamber, from which the sound produced by the vibration of the side which acts as a diaphragm and to which the tracing-point is secured passes out
 5 through the tube Q and horn P in a practically straight line, thus producing very loud and very distinct reproductions of the sounds that produce the record. The reproducer is of course very light and very cheap, and but for
 10 the pressure produced thereon as a result of the slight flexure of the tube Q would not be satisfactory for the intended purpose. This construction of the reproducer is such that I am enabled to utilize the same device as a re-
 15 corder by simply cementing or gluing to the opposite side of the box from that on which the reproducing-point is mounted a suitable support for a recording-stylus W, this support being preferably a small metallic clip
 20 having an angularly-disposed tube to receive the stylus.

A phonograph made in accordance with my invention is exceedingly cheap, simple, and durable, and yet is quite satisfactory for a
 25 machine of the cheaper class, where especial accuracy cannot be expected.

Obviously numerous changes may be made in the construction and disposition of the parts without departing from the spirit of my
 30 invention—such, for instance, as substituting other material for the pasteboard boxes, which are the preferred construction of my reproducer and recorder, for so far as relates to the broad idea of my invention any mate-
 35 rial that enables the construction of a flat box having opposing sides to which the recorder or reproducer, or both, can be attached would fall within my invention and are contemplated by the claims.

40 Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a phonograph, the combination with a base, of a cylinder, a support pivotally
 45 mounted on said base, a horn mounted on the outer end of said support, and a reproducer or recorder connected with said horn and disposed beneath the cylinder and held in operative contact therewith by the weight of said
 50 horn.

2. In a phonograph, the combination with a cylinder, of a counterbalanced reproducer or recorder, and a horn serving as a counter-
 55 weight for holding said reproducer or recorder in operative contact with said cylinder.

3. In a phonograph, the combination with a base, a cylinder, a feed-shaft, and a support pivotally mounted on said base, of a feed-
 60 arm connected with said support, a reproducer or recorder also connected with said support, and a horn mounted upon said support at that side of the center of gravity of the pivot of said support which will permit said horn to

counterbalance said feed-arm and said repro- 65
 ducer or recorder and hold them in operative contact with the feed-shaft and with the cylinder, respectively.

4. In a phonograph, the combination with a base, a cylinder, and a horn-support pivotally mounted on the base, of means for rotat- 70
 ing the cylinder and for moving the horn-support lengthwise of the cylinder, a reproducer or recorder held in operative contact with said cylinder by the weight of said horn, and a flexible connection between said repro- 75
 ducer and recorder and said horn-support, substantially as described.

5. In a phonograph, the combination with a cylinder, of a counterbalanced reproducer or recorder, a part of the structure mounted 80
 to serve as a counterweight for holding the reproducer or recorder in operative contact with said cylinder, and an elastic tube interposed between the reproducer or recorder and such counterweight. 85

6. In a phonograph, the combination with a rectangular base-frame cut away at one end thereof, an arbor-shaft journaled centrally in said frame opposite the cut-away end there- 90
 of, a fly-wheel on said shaft, a crank-arm for rotating the same and a cylinder mounted thereon, a screw-threaded feed-shaft journaled on said frame parallel with the arbor-shaft and geared thereto, a guide-rod secured in said frame parallel with the feed-shaft, a 95
 horn-support loosely mounted on said guide-rod, a feed-arm in said support engaging the feed-shaft, a horn attached to said support and operating to hold the feed-arm in contact with the feed-shaft, a reproducer and an elastic 100
 tube connecting said reproducer with said support, substantially as described.

7. In a phonograph, the combination with feeding mechanism, of a flat pasteboard box connected therewith, a reproducing or record- 105
 ing point secured thereto, a horn-support, an elastic tubular connection between said box and said horn-support, a part of the structure serving as a counterweight to flex said tubular connection, so as to hold the point on said box in yielding contact with a record or record- 110
 blank, substantially as described.

8. In a phonograph, the combination with a base, of a cylinder and feed-shaft geared to- 115
 gether and suitably mounted upon said base, means for rotating said cylinder and feed-shaft, a support pivotally mounted upon said base, a reproducer or recorder connected with said support, and a part of the structure con- 120
 nected with said support at that side of the center of gravity thereof which will permit the weight of such part to hold said reproducer or recorder in operative contact with said cylinder, substantially as described.

9. In a phonograph, the combination with 125
 a base, of a cylinder and feed-shaft geared to-

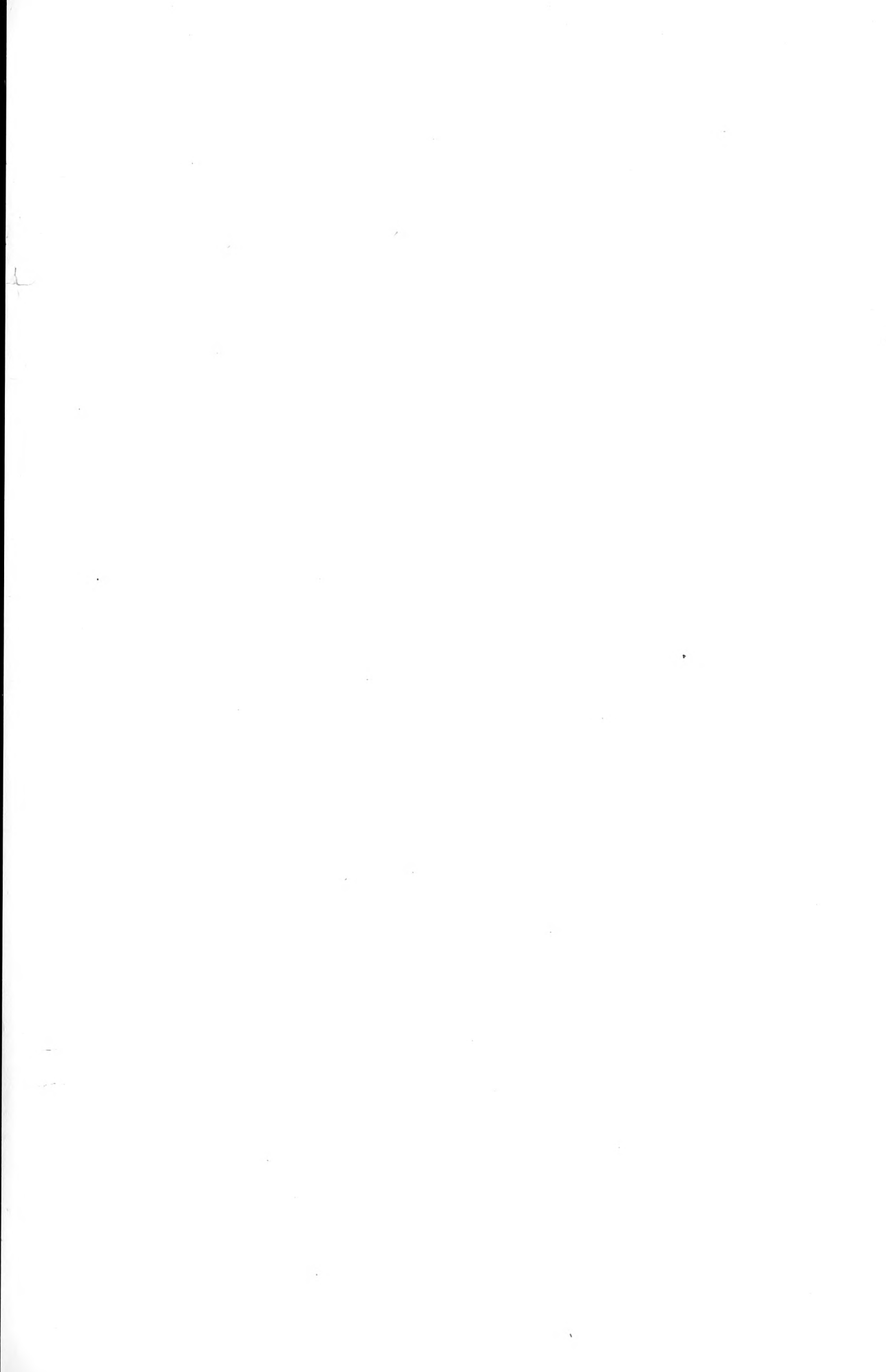
5 gether and suitably mounted upon said base, means for rotating said cylinder and feed-shaft, a horn-support pivotally and slidably mounted upon said base, a feed-arm and re-
producer or recorder, both connected with said horn-support, and a horn connected with said horn-support at that side of the center of gravity thereof which will permit the weight

of said horn to hold said reproducer or recorder and said feed-arm in operative contact with said cylinder and with said feed-shaft, respectively, substantially as described. 10

PAUL E. VAN VALKENBURGH.

Witnesses:

J. E. HALLENBECK,
M. E. SHIELDS.



No. 773,344.

PATENTED OCT. 25, 1904.

J. SANDERSON.
TELESCOPIC HORN.

APPLICATION FILED MAY 24, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

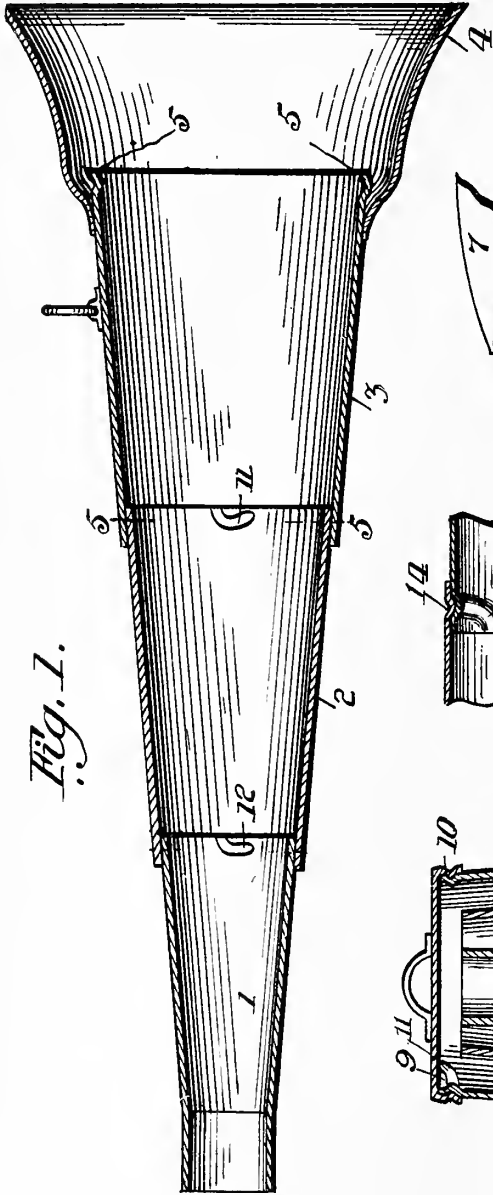


Fig. 1.

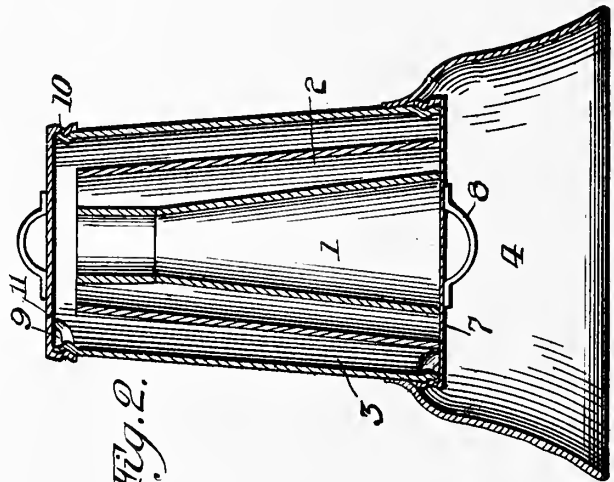


Fig. 2.



Fig. 3.

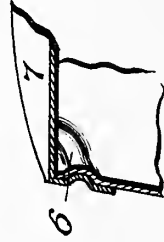


Fig. 4.

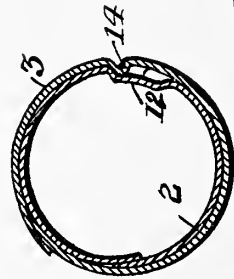
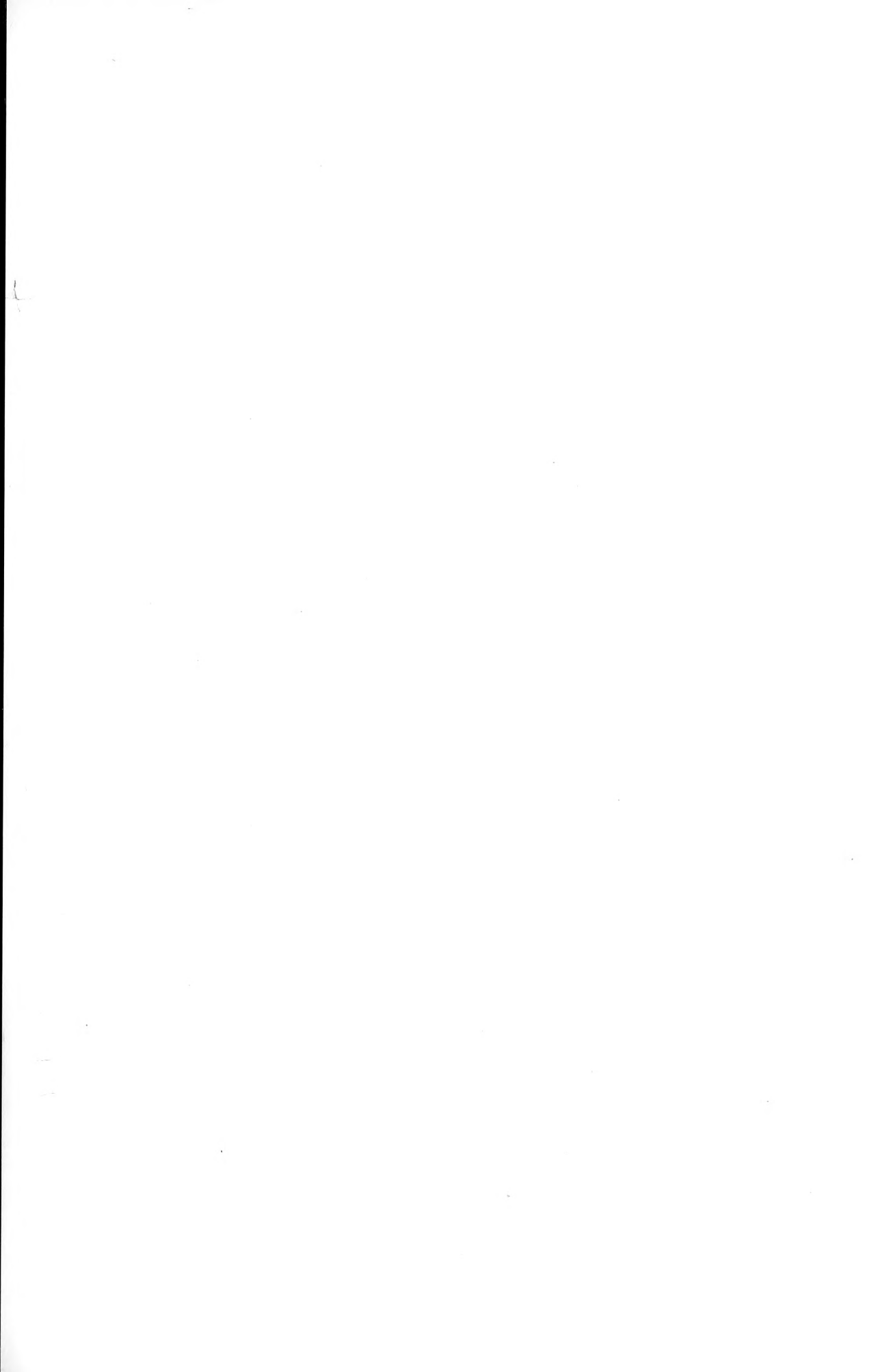


Fig. 5.

Witnesses:
H. W. Butler
E. E. Potter

Inventor,
John Sanderson,

By
A. C. Ernst & Co.
Attorneys.

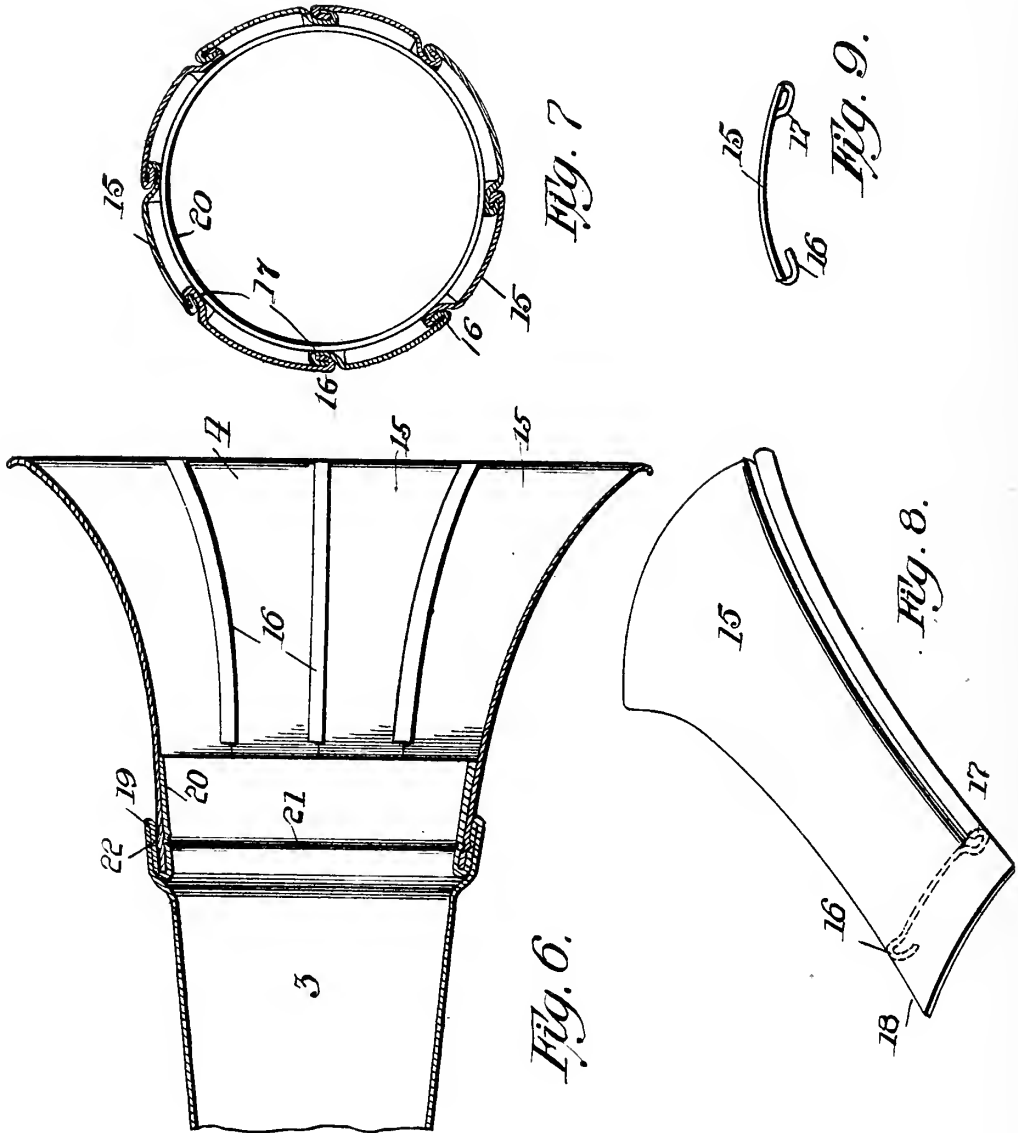


J. SANDERSON.
TELESCOPIC HORN.

APPLICATION FILED MAY 24, 1904.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:
J. H. Butler,
E. E. Potter.

Inventor
John Sanderson,
By *N. C. Evert & Co.*
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN SANDERSON, OF PITTSBURG, PENNSYLVANIA.

TELESCOPIC HORN.

SPECIFICATION forming part of Letters Patent No. 773,344, dated October 25, 1904.

Application filed May 24, 1904. Serial No. 209,516. (No model.)

To all whom it may concern:

Be it known that I, JOHN SANDERSON, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Telescopic Horns, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in telescopic horns, and has for its object the provision of novel means whereby horns may be telescoped and securely retained in the collapsed position.

The present invention relates to all forms of horns, such as are used for phonographs, graphophones, musical instruments, and the like; and one of the many objects of my invention is to produce a horn that may be extremely simple in construction, strong, durable, comparatively inexpensive to manufacture, and highly efficient in its use.

My invention broadly consists in the novel construction, combination, and arrangement of parts to be hereinafter more specifically described, and fully pointed out in the claims.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this application, and wherein like numerals of reference indicate like parts throughout the several views, in which—

Figure 1 is a vertical sectional view of my improved horn, showing the horn in the extended position. Fig. 2 is a similar view showing the horn in the collapsed position. Fig. 3 is an enlarged detail view of the joint, showing a vertical sectional view thereof. Fig. 4 is a similar view of the lid. Fig. 5 is a transverse sectional view taken on the line 5 5 of Fig. 1. Fig. 6 is a longitudinal sectional view of the funnel portion of the horn. Fig. 7 is a cross-sectional view of the funnel. Fig. 8 is a perspective view of one of the parts of the funnel, and Fig. 9 is an end view thereof.

In the drawings, the reference-numeral 1 represents the mouthpiece, 2 and 3 integral sections, and 4 the bell of the horn, these sections 1, 2, 3, and 4 being constructed in a manner as to permit the horn to readily telescope

one section within the other. The section 3 carries at its enlarged end flanges 5 5, which are slightly curved, as shown at 6, to receive a lid or cover 7, which is adapted to form a locking engagement therewith, said lid carrying a handle 8. The sections 1 and 2 when in the collapsed position are inclosed within the section 3 and are held in this position by means of the lid or cover 9, carrying flanges 10, which are adapted to lock in the recesses 11, the latter being slightly curved, as shown in Figs. 1 and 2 of the drawings. The joint between the sections is formed by the curved depressed portion 12 and a similar raised portion 14 fitting therein.

The funnel-shaped portion 4 of the horn comprises a plurality of sections 15, a portion of their edges being curved, as indicated at 16 and 17, whereby each section may be secured one within the other, forming a funnel-shaped horn, and the rear end of these sections have their curved edges cut away, as indicated at 18, whereby each section may be secured to the section 3 of the horn. This section 3 carries the annular flange 10, which is formed upon itself and extends around the exterior of the section 4, and in the portion 20 is formed a raised annular groove 21, which is adapted to engage the raised annular groove 22 of the funnel-shaped portion of the horn.

In Fig. 7 I have illustrated how the different sections 15 are secured together by means of the curved edges 16 and 17, and while I have herein shown this construction of funnel for horns it is obvious that I may readily employ the form of funnel illustrated in Fig. 1 of the drawings and that the convenience of handling the horn where it comprises a plurality of sections will be readily appreciated by those who have use for the same, and the many other advantages obtained by the use of this invention will be apparent from the foregoing description, taken in connection with the accompanying drawings.

It will be obvious that various slight changes may be made in the details of construction without departing from the general spirit of my invention.

Having fully described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. A horn composed of a plurality of telescopic sections, a lid on each end of the outer-most of said telescopic sections to inclose the remaining section, substantially as described.

2. In a horn, the combination of a plurality of telescopic sections of gradually-increasing size, and a bell-mouth secured to the largest section, with two lids, one fitted to the smaller end of the largest section, the other fitted to the larger end of the same section and within the bell-mouth.

3. A horn composed of a plurality of telescopic sections having curved grooves formed

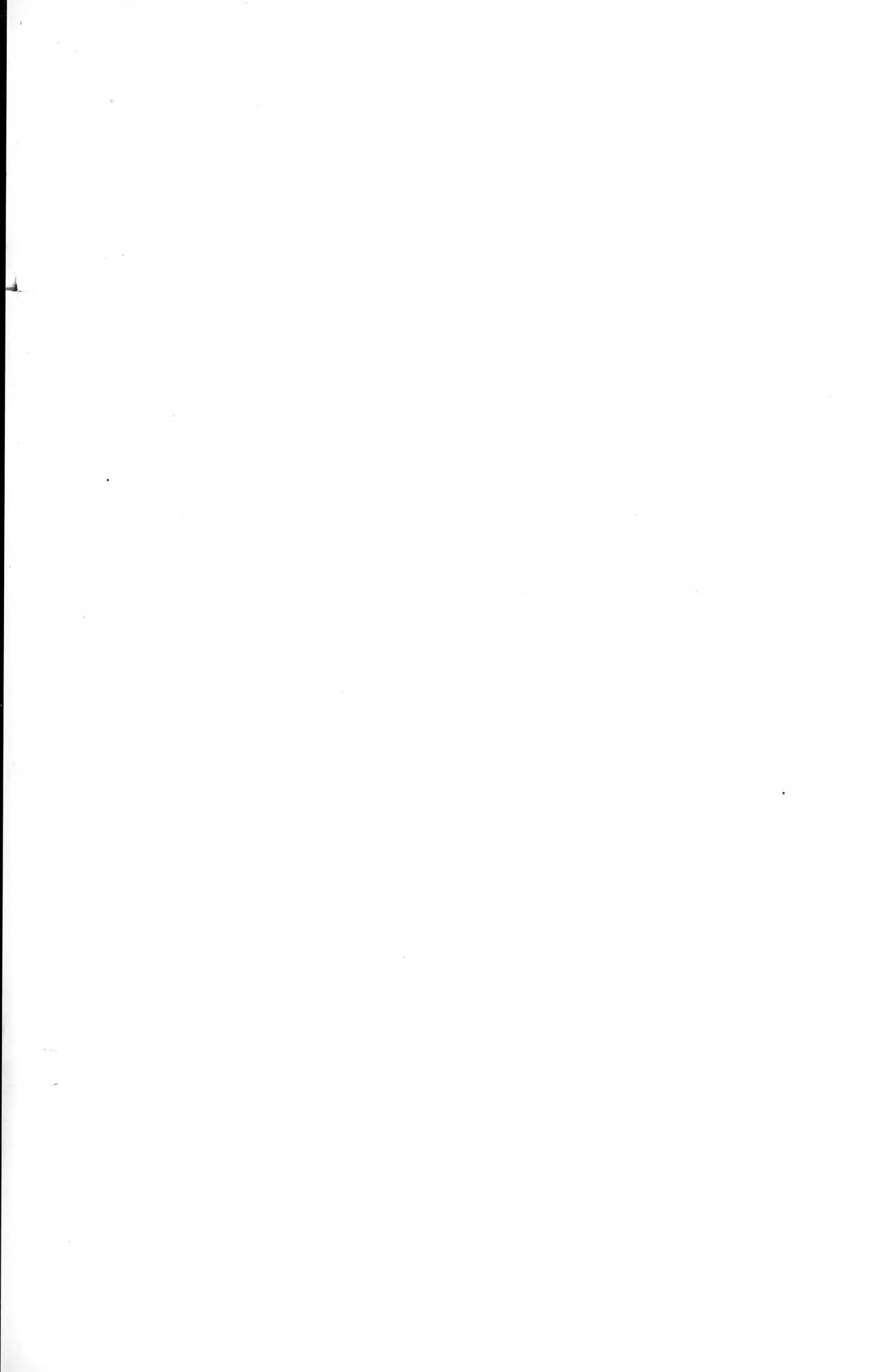
therein, and corresponding raised portions formed in the opposite sections adapted to extend into and fit said grooves, one of said sections composed of a plurality of sections, each last-mentioned section having its edges curved whereby said sections may be secured together, and means whereby said sections may be secured to the other sections, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN SANDERSON.

Witnesses:

H. C. EVERT,
E. E. POTTER.



B. DUBINSKI.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 17, 1904.

NO MODEL.

8 SHEETS—SHEET 1.

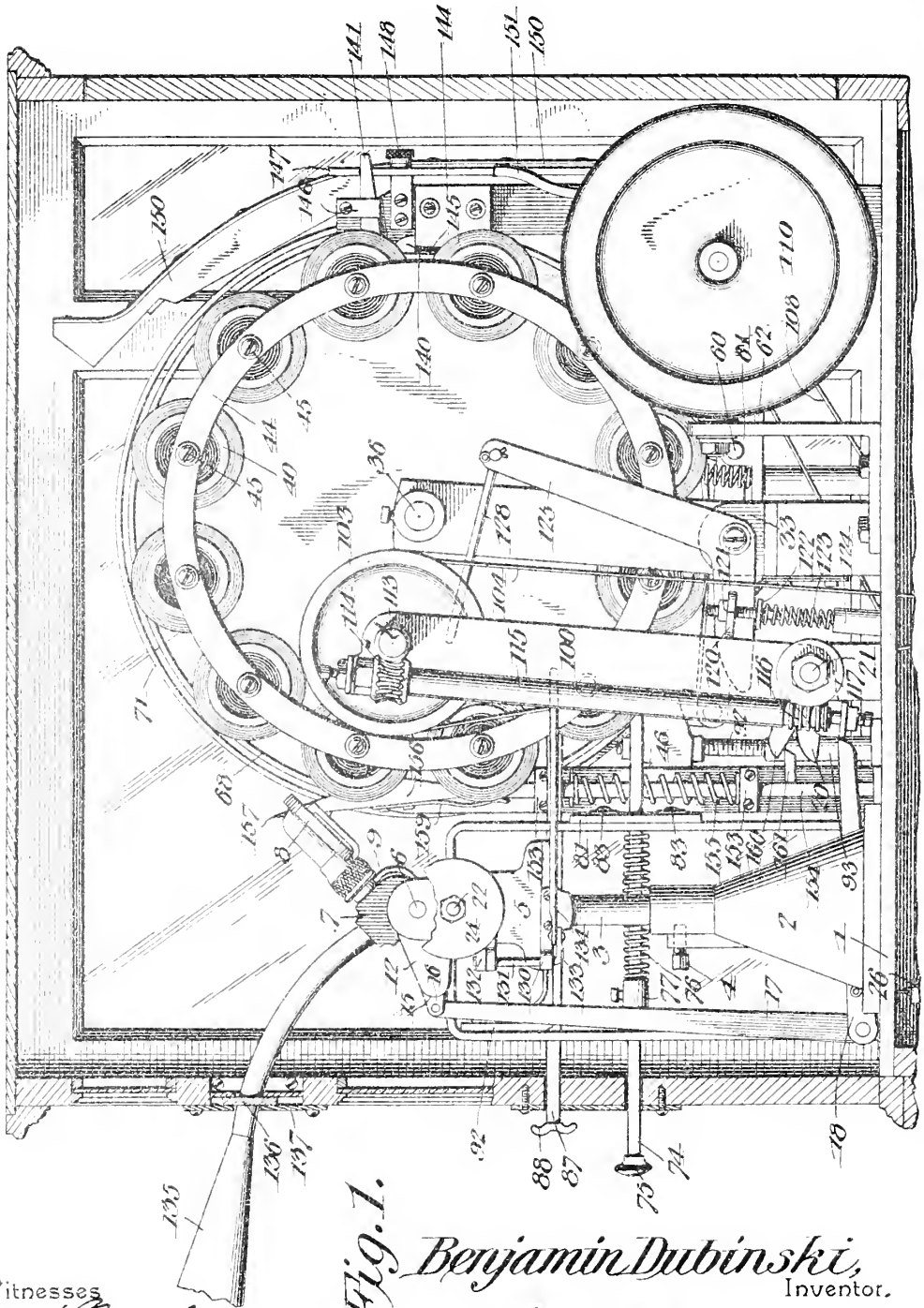
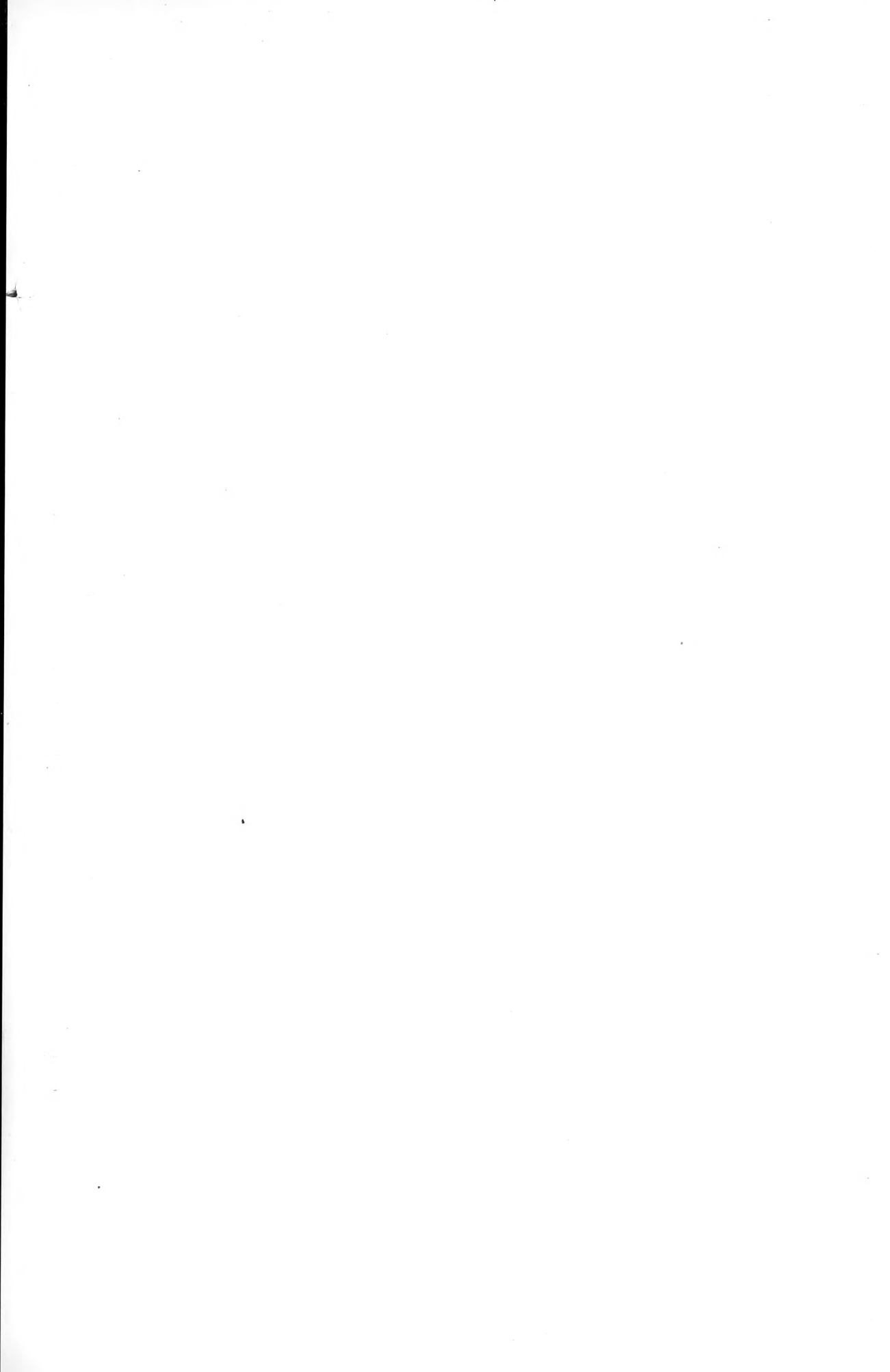


Fig. 1.

Benjamin Dubinski,
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Attorneys

Witnesses
E. J. Stewart
Geo. E. Stanton



No. 773,486.

PATENTED OCT. 25, 1904.

B. DUBINSKI.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 17, 1904.

NO MODEL

8 SHEETS—SHEET 2.

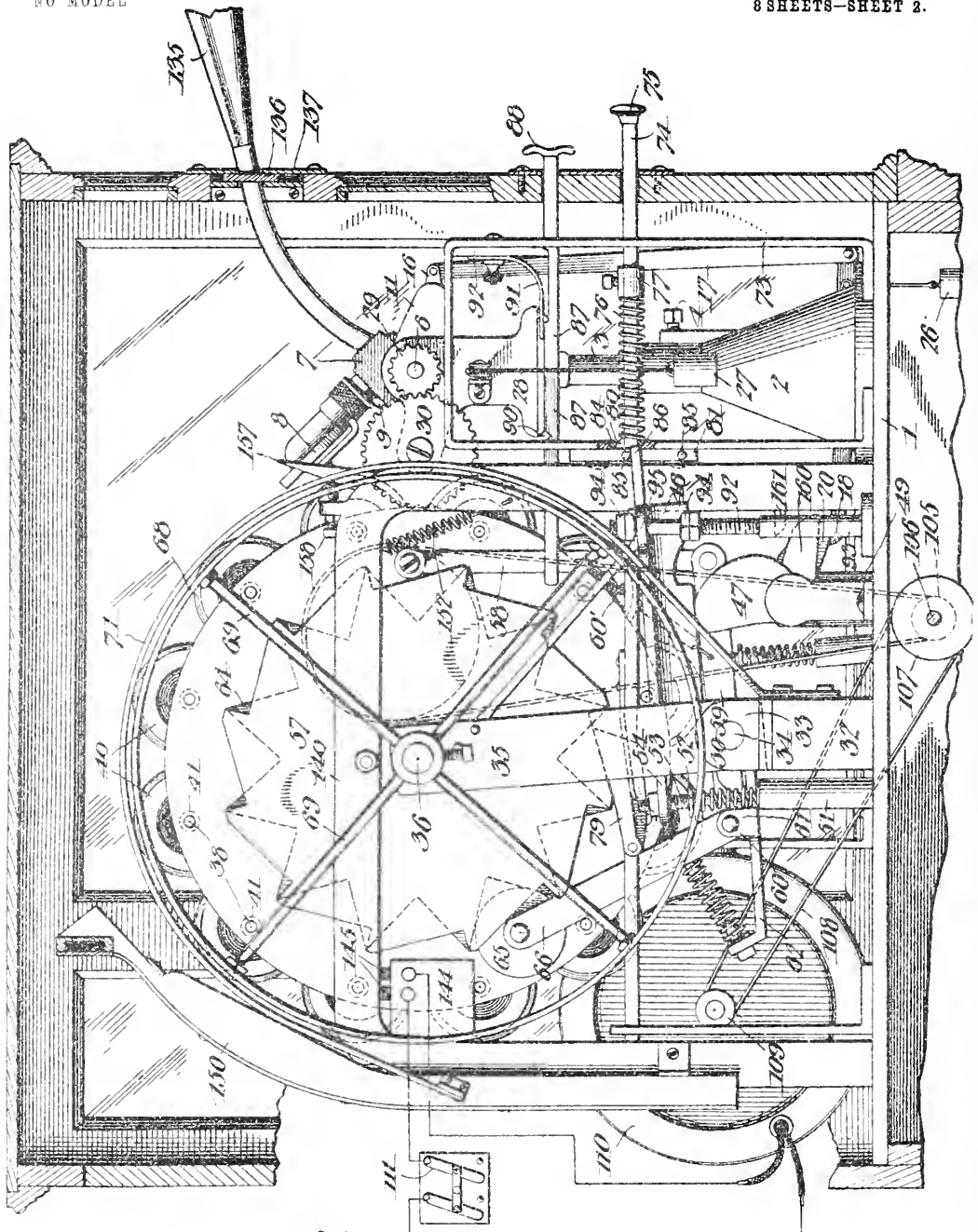
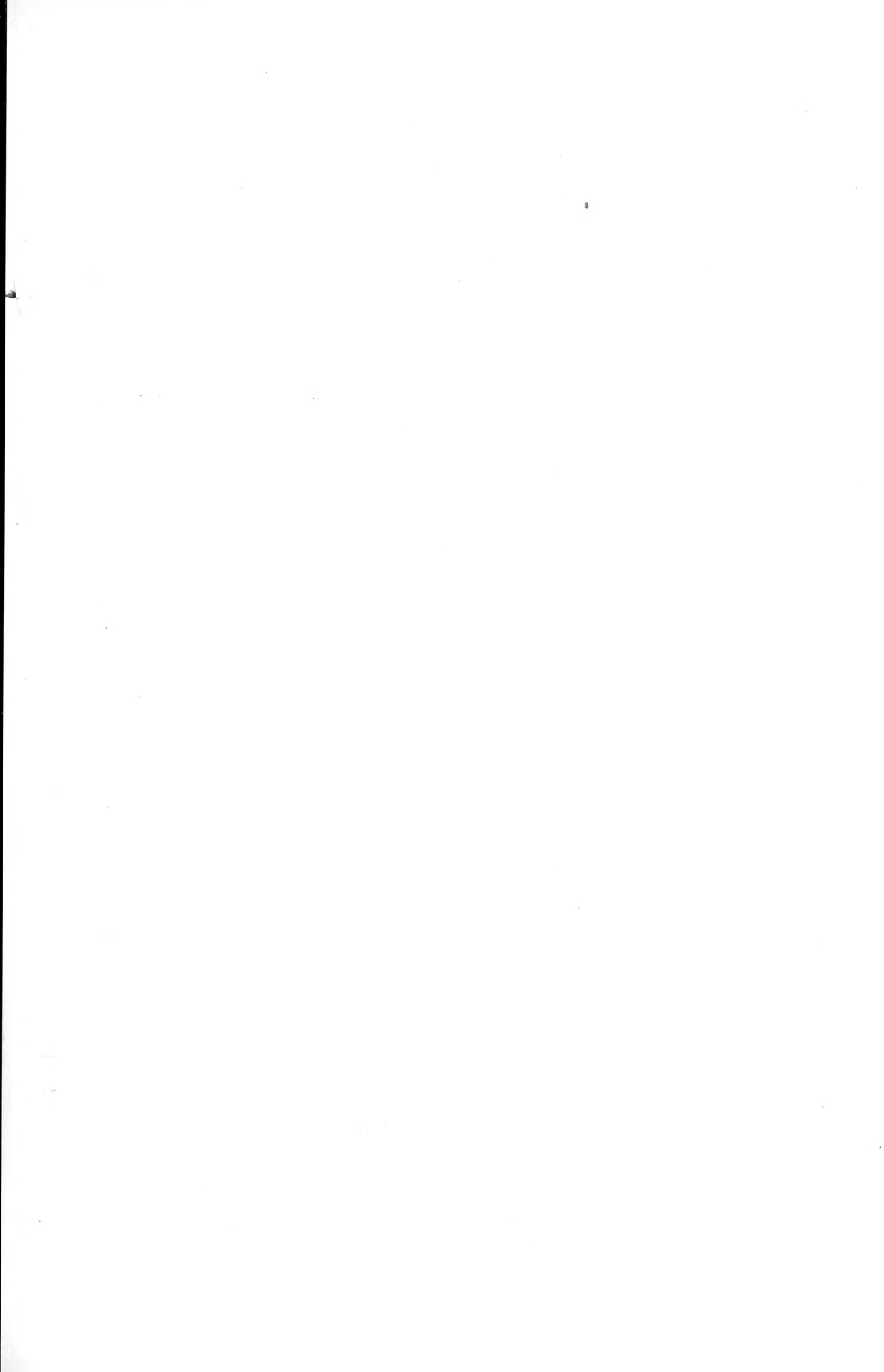


Fig. 2.

Witnesses
E. H. Stewart
Jos. E. Carter

111
 112
Benjamin Dubinski,
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 Attorneys



B. DUBINSKI.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 17, 1904.

NO MODEL.

8 SHEETS—SHEET 3.

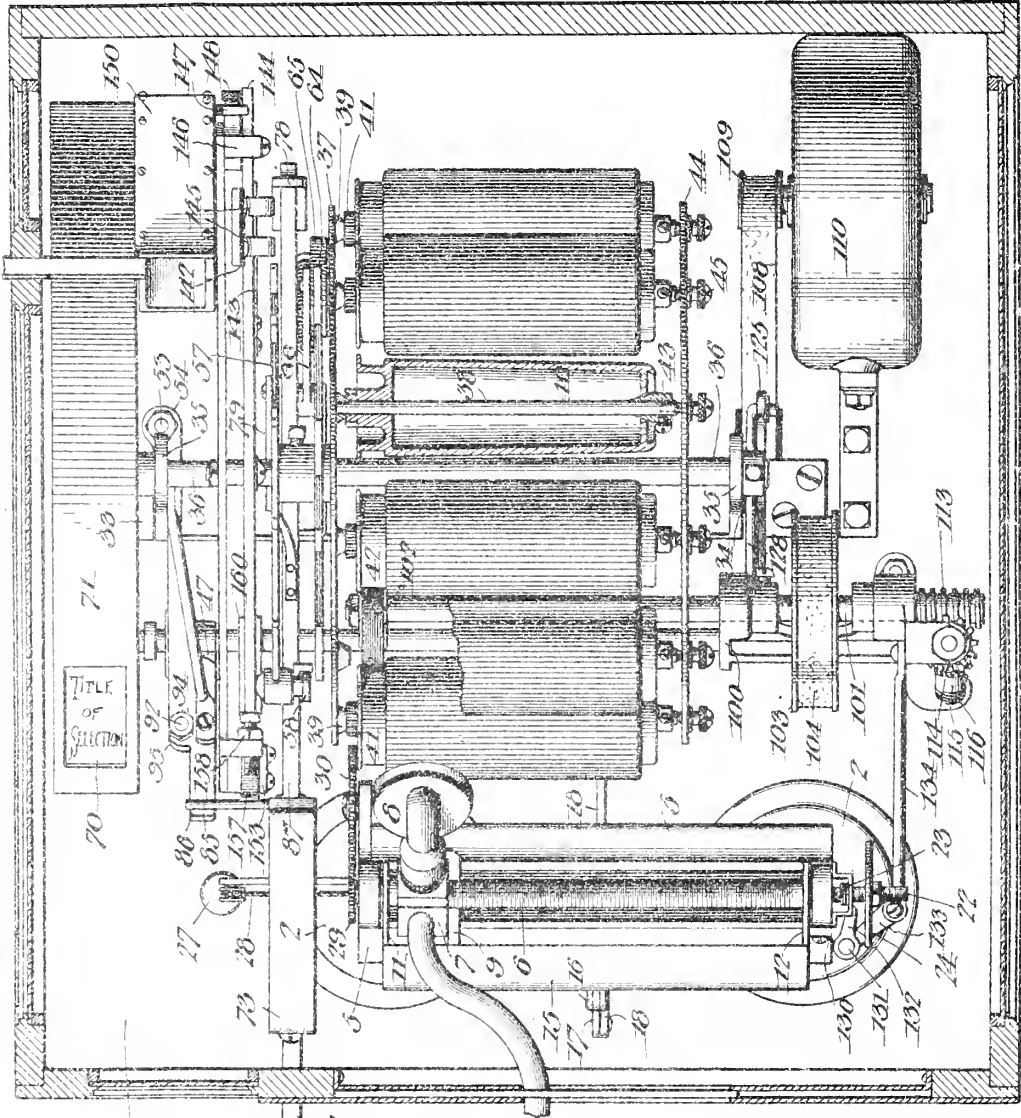
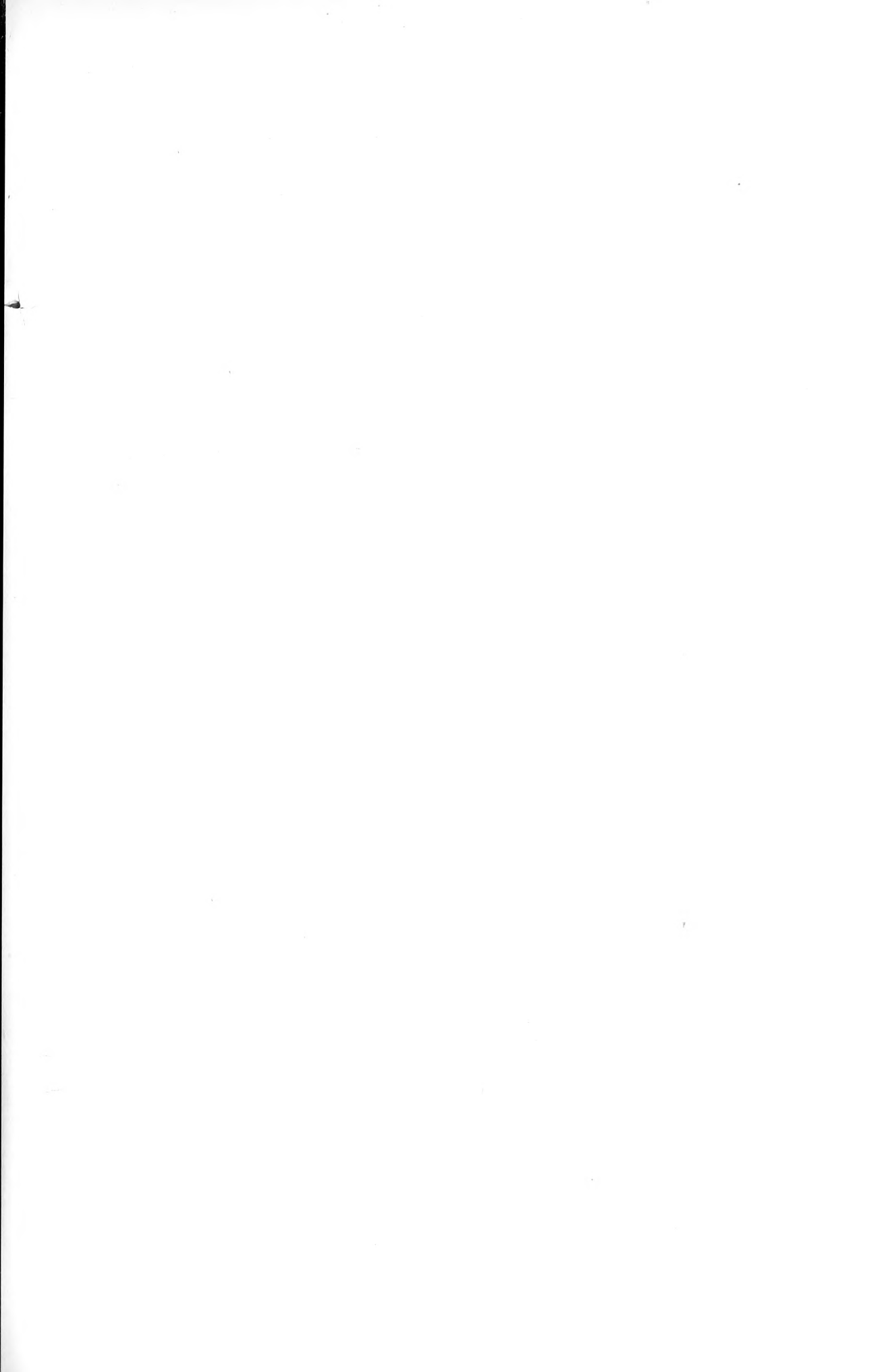


Fig. 3.

Witnesses
E. J. Schwatt
Geo. E. Porter

Benjamin Dubinski,
 Inventor.
 by *Chas. H. Snow & Co.*
 Attorneys

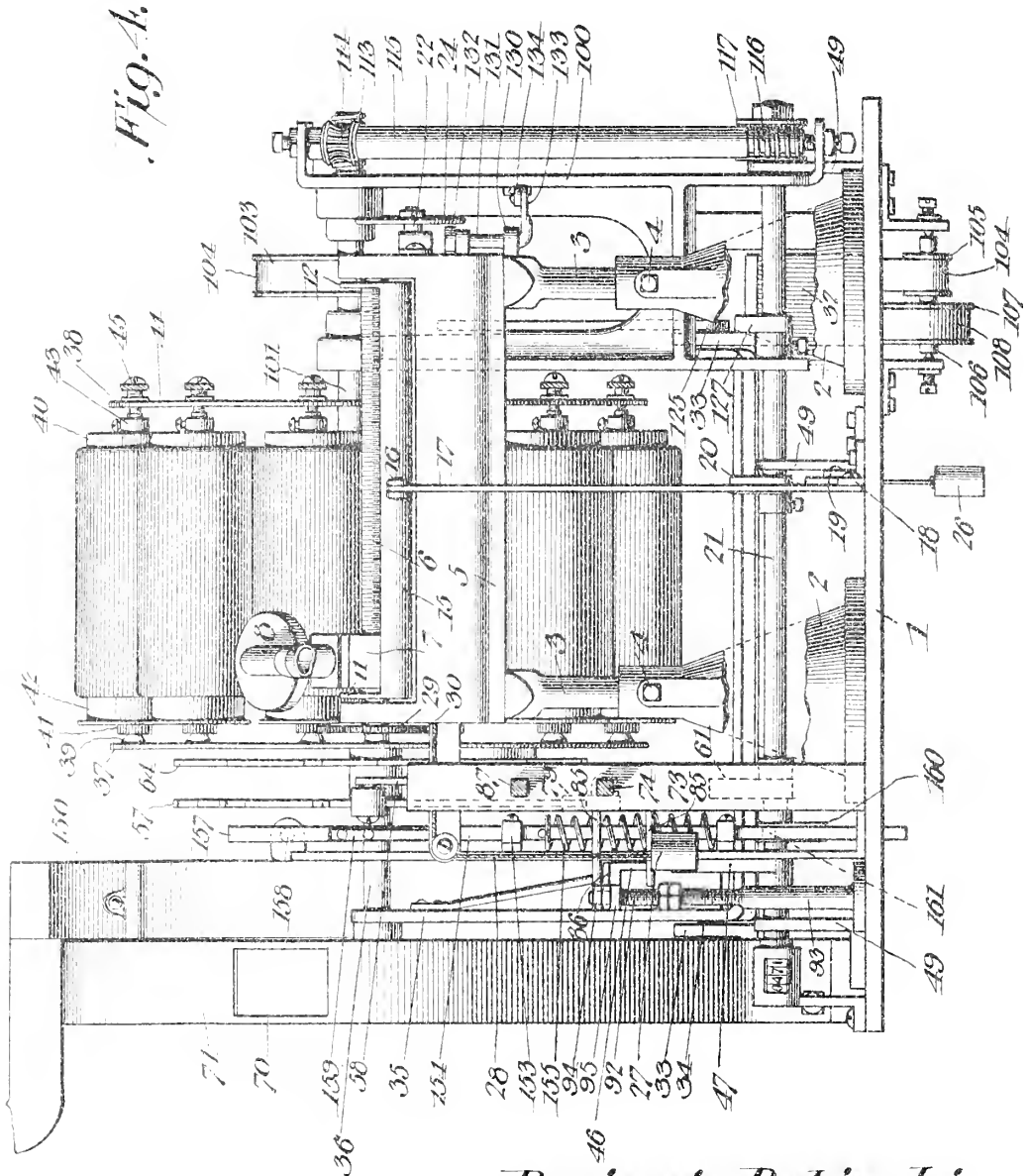


B. DUBINSKI.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 17, 1904.

NO MODEL.

8 SHEETS—SHEET 4.



Witnesses
E. J. Stewart
Jos E. Parker

Benjamin Dubinski,
 Inventor.
 by *C. Snow & Co.,*
 Attorneys



B. DUBINSKI.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 17, 1904.

NO MODEL.

8 SHEETS—SHEET 6.

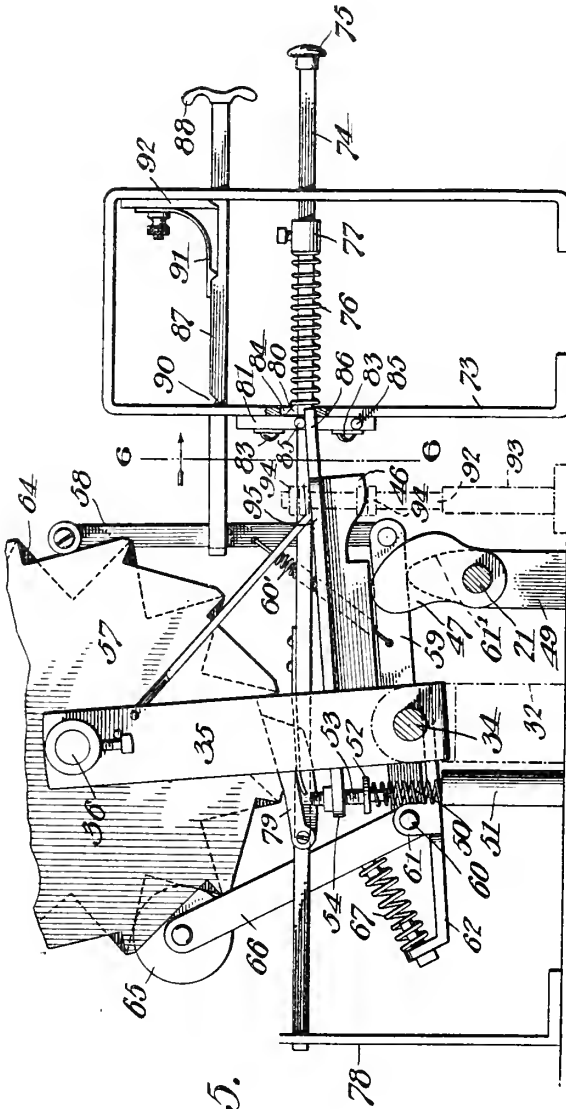


Fig. 5.

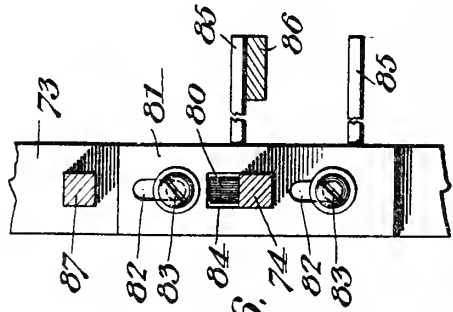


Fig. 6.

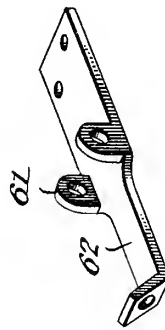
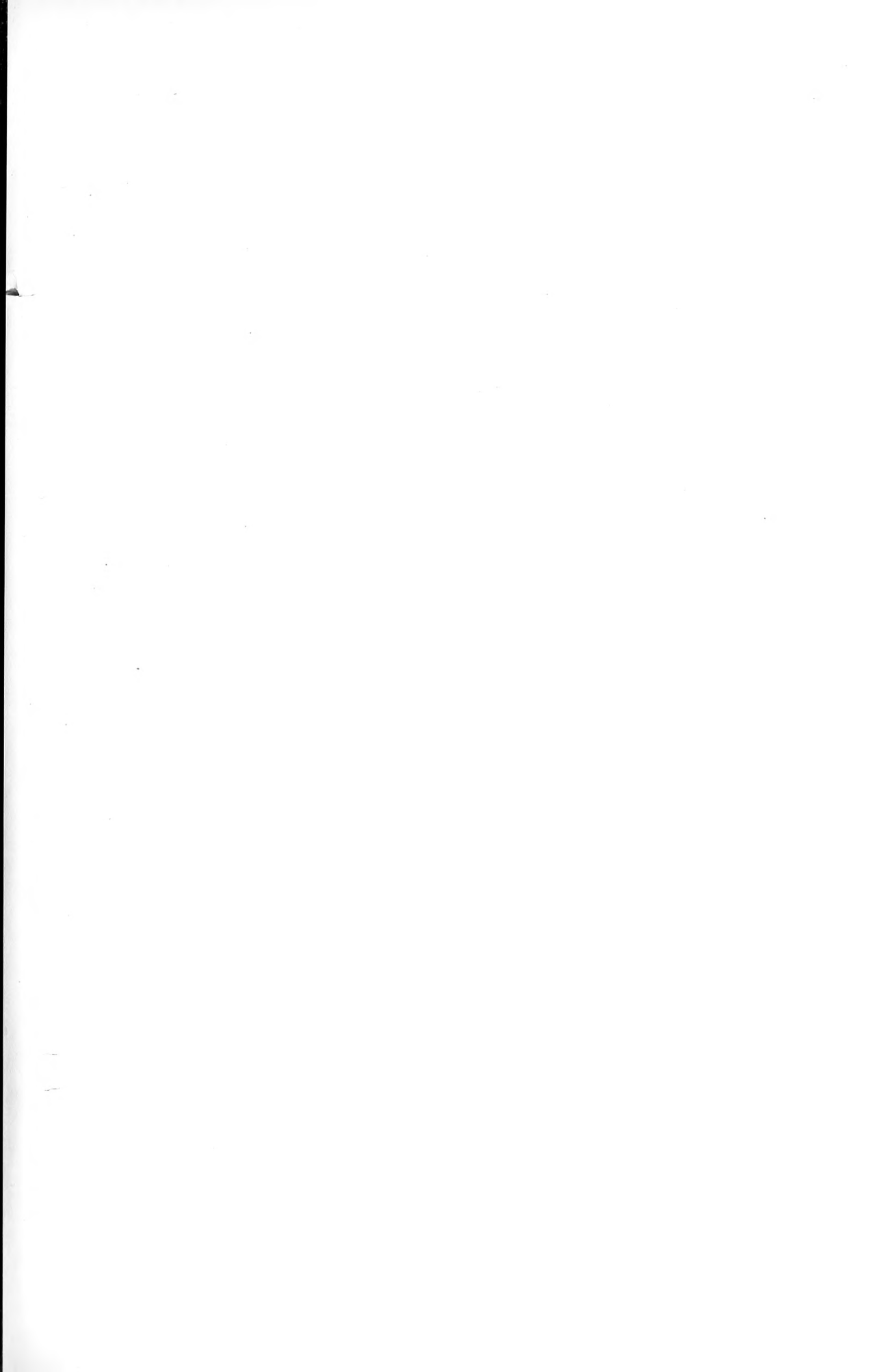


Fig. 7.

Witnesses
E. H. Stewart
Geo. E. Parker

Benjamin Dubinski,
 Inventor.

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 Attorneys



B. DUBINSKI.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAY 17, 1904.

NO MODEL.

8 SHEETS—SHEET 6.

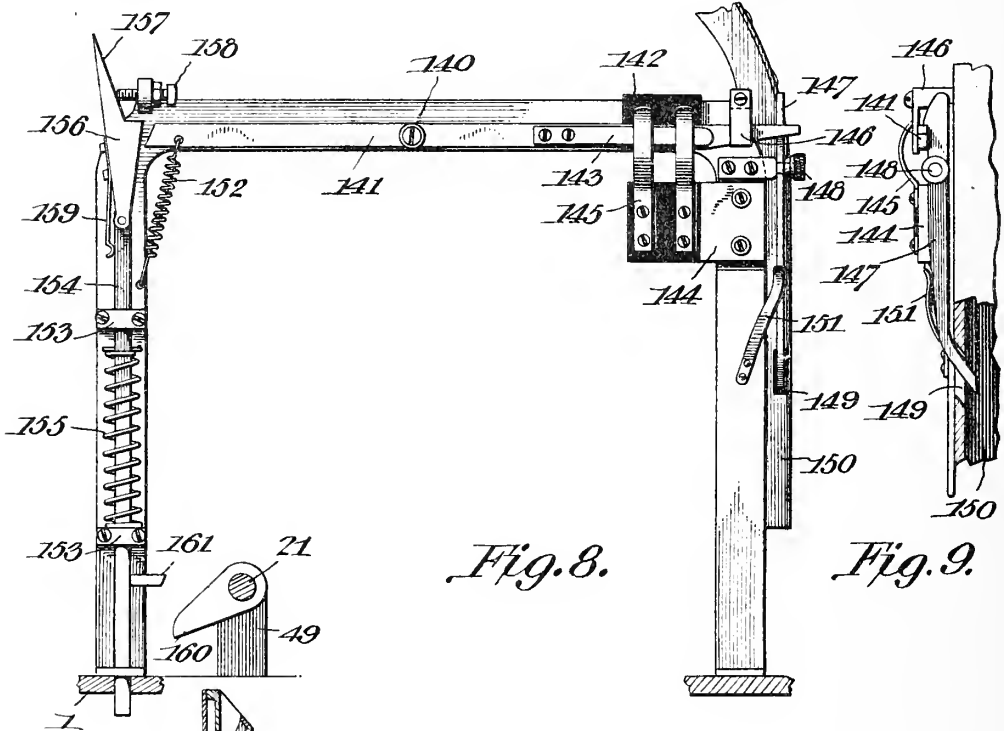


Fig. 8.

Fig. 9.

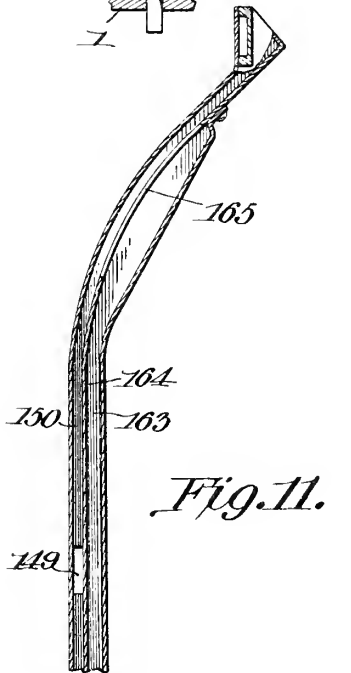


Fig. 11.

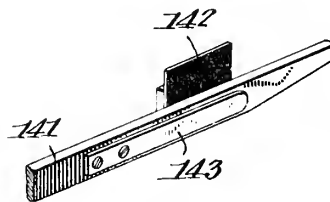


Fig. 10.

Witnesses
E. H. Stewart
Geo. E. Carter

Benjamin Dubinski,
 Inventor.
 by *C. A. Snowles*
 Attorneys



B. DUBINSKI.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 17, 1904.

NO MODEL.

8 SHEETS—SHEET 7.

Fig. 13.

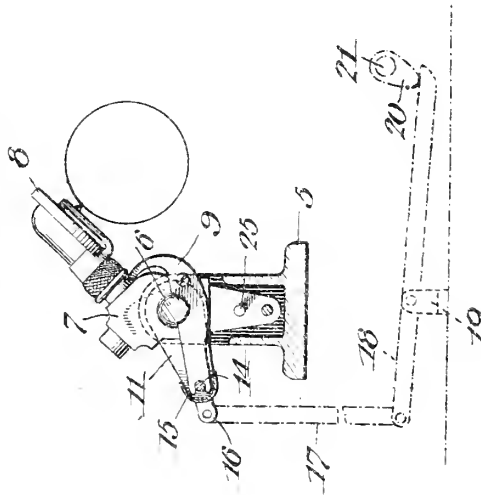


Fig. 14.

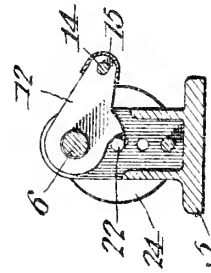


Fig. 12.

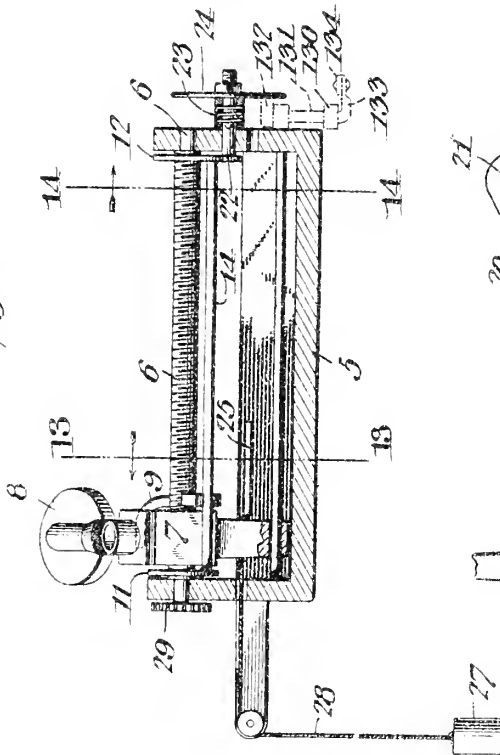
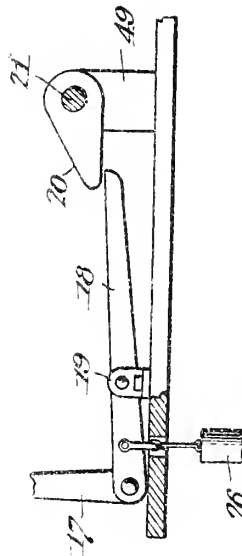


Fig. 17.



Witnesses
E. H. Stewart
Geo. E. Parker

Benjamin Dubinski
 Inventor.

by *Chas. H. Snow & Co.*
 Attorneys



B. DUBINSKI.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 17, 1904.

NO MODEL.

6 SHEETS—SHEET 3.

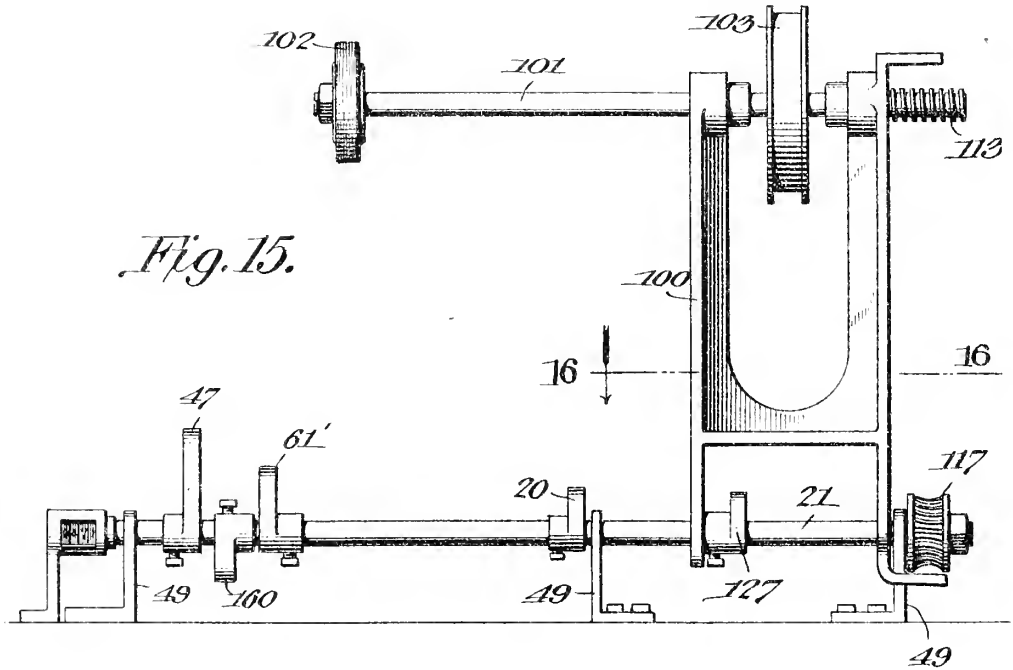


Fig. 15.

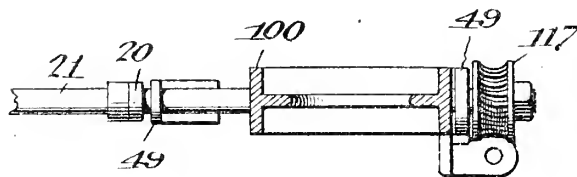


Fig. 16.

Witnesses
E. J. Stewart
Geo. E. Parker

Benjamin Dubinski,
 Inventor.

by *Chas. Snow & Co*
 Attorneys

UNITED STATES PATENT OFFICE.

BENJAMIN DUBINSKI, OF SAN ANTONIO, TEXAS.

SOUND-REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 773,486, dated October 25, 1904.

Application filed May 17, 1904. Serial No. 208,420. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN DUBINSKI, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented a new and useful Sound-Reproducing Machine, of which the following is a specification.

This invention relates to sound-reproducing machines, and especially to a machine of that general class in which a plurality of records are presented successively to a single sound-box.

The principal object of the invention is to provide an improved machine of the multiple-record type in which each separate record is independently revolved during its reproduction while the remaining records are idle and, further, to so arrange the driving mechanism that each record-carrier serves as a means for imparting movement to the sound-box and its connected mechanism.

A further object of the invention is to provide a machine of this class in which mechanism of simple and economical construction is so arranged that the records are automatically shifted to present them in successive order in front of the sound-box, provision being made for preventing the operation of the shifting mechanism, so that when necessary a record may be repeated.

A further object in this connection is to provide means whereby any person may readily shift the records in order to bring any desired record into playing position and, further, to so arrange the manually-operable shifting mechanism as to prevent movement of the records during the operation of the machine, so as to prevent injury to the records.

A still further object of the invention is to provide an improved sound-box controlling and shifting mechanism for automatically returning the sound-box to its initial position after a reproduction.

A still further object is to provide means whereby in the failure of any part of the mechanism the sound-box will be raised at the completion of a reproduction and automatically returned to the starting-point.

A still further object of the invention is to provide a multiple-record carrier in which

the whole frame is moved rearward away from the sound-box during the shifting of the record-carriers.

A still further object of the invention is to provide improved means whereby the speed of operation of the machine may be readily controlled in accordance with the speed at which the records have been produced.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in the novel construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the forms, proportions, size, and minor details of construction may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a view in end elevation of a sound-reproducing machine constructed in accordance with the invention, the casing being shown in section. Fig. 2 is a similar view looking from the opposite end of the machine. Fig. 3 is a front elevation of the machine with the casing removed. Fig. 4 is a plan view of the machine, partly in section. Fig. 5 is a detail end elevation, partly in section, illustrating principally the mechanism for controlling the shifting of the records. Fig. 6 is a sectional elevation of a portion of the same on the line 6 6 of Fig. 5. Fig. 7 is a detail perspective view of one of the frame-arms more specifically described hereinafter. Fig. 8 is a detail elevation, parts being shown in section, of the starting mechanism operable by the insertion of a coin or check. Fig. 9 is a detail view of a portion of the same looking in the direction of the arrow, Fig. 8, parts being shown in section. Fig. 10 is a detail perspective view of a portion of the circuit-closing lever. Fig. 11 is a detail sectional view of the coin-chute. Fig. 12 is a front elevation of the sound-box and its associated mechanism, the carrying-frame being shown in section. Fig. 13 is a sectional elevation of the same on the line 13 13 of Fig. 12. Fig. 14 is a similar view on the line 14 14 of Fig. 12. Fig. 15 is an elevation of one of the frames and illustrat-

ing more particularly the mechanism for imparting movement to the record-carriers. Fig. 16 is a sectional plan view of a portion of the structure on the line 16 16 of Fig. 15.

5 Fig. 17 is a detail view of the cam and lever for transmitting movement to the threaded lever of the sound-box mechanism.

Similar numerals of reference indicate similar parts in each of the figures of the drawings.

10 The machine forming the subject of the present invention is one of that class in which a plurality of phonograph or graphophone records are arranged in an annular series to be presented successively in alinement with a
15 sound-box and a sound-box carrier.

The working parts of the machine are supported on a suitable base 1, at the front of which are hollow standards 2 for the reception of posts 3, which may be adjusted vertically in the standards and locked in position by set-screws 4. These posts serve as supports for a horizontally-disposed frame 5, having at its opposite ends bearings for the reception of a screw-shaft 6. The screw-shaft
25 extends, as usual, through a sound-box carriage 7, which supports a sound-box 8 of any ordinary type. At one side of the sound-box carrier is provided a lever 9, carrying a half-shaft 6, and the rear end of the lever is bent
30 under the net portion of the sound-box, so that when the threaded portion is moved from engagement with the shaft by depression of the front end of the lever its rear and bent end will raise the sound-box from engagement
35 with the record. To the screw-shaft is pivoted a pair of arms 11 and 12, disposed, preferably, at the ends of the shaft and serving as supports for a rod 14, which fits within the recessed outer end of the lever 9. In front
40 of the rod 14 is a guard 15 of the usual construction, and to the front of this guard is secured a lug 16, connected by a link 17 to one end of a lever 18, that is pivoted at
45 a point intermediate of its length to a lug or standard 19, carried by the base-plate. The opposite end of the lever is operated upon by a cam mounted on a cam-shaft 21, hereinafter described, and operated in such manner that
50 it will at times come into engagement with the lever 18 and by depressing its inner end will raise the outer end of the lever 9 and force the threaded portion of said lever into engagement with the traversing-shaft 6 and
55 at the same time the sound-box will be lowered until the lever lies in engagement with the record.

In order to hold the lever 9 in proper position during the travel of the sound-box, the
60 lever or arm 12 when elevated is locked in position by a pin 22, extending through a guiding-opening in the end portion of the fixed frame 5 and normally held in locking position by means of a coiled compression-
65 spring 23. Secured to the locking-pin is a

disk or arm 24, adapted to be engaged by a pin 25, carried by the lower portion of the sound-box carrier, and when a record has been reproduced this pin will engage the disk and force the same outward until the pin 22 has
70 been removed from under the arm 12, allowing said arm to fall, the arm, the guard, and the rod 14 being moved downward by a weight 26, secured by a cord or chain to the front portion of the lever 18. This immediately
75 removes the threaded portion of the lever from engagement with the traversing-shaft and at the same time elevates the sound-box proper from engagement with the record. The sound-box is then drawn back to its initial position by means of a weight 27, carried by a suitably-guided cord or chain 28.

On the end of the screw-shaft is secured a small pinion 29, intermeshing with a gear 30, that is carried by a stud-shaft mounted on an
85 arm projecting from the fixed frame, and movement is imparted to the gear 30 from the several record-carriers in the manner hereinafter described. To the base-plate is secured a bar or sill 32, carrying a number of brackets
90 or standards 33, in which is mounted a pivot-shaft 34, and to the shaft 34 is secured a U-shaped frame 35, having a pair of parallel approximately vertical arms the upper ends of which have bearing-openings for the reception of a horizontal shaft 36. To the shaft
95 36 is keyed a disk 37, to which are secured a number of mandrel-carrying shafts 38, each of said shafts being provided at a point adjacent to the disk with a cone 39. On each of the shafts 38 is placed a mandrel 40, adapted for the reception of the cylindrical records usually employed in phonographs, graphophones, and similar sound-reproducing machines. At one end of the mandrel is a pinion
100 41, adapted to engage with the gear-wheel 30 and transmit motion to the sound-box and sound-box carriage, and this end of the mandrel is also provided with a friction-surface 42, with which engages a small friction-roller
105 for the purpose of transmitting rotative movement to said mandrel. The opposite end of the mandrel is held in place by an adjustable cone 43, mounted on the mandrel-shaft and locked in adjusted position by means of a set-screw. The outer ends of the mandrel-shafts are all secured to a ring 44 by means of
110 screws 45, so that they may be held in properly-spaced relation, the shafts being rigid and the mandrels revolving freely on the cone-bearings 39 and 43.

The frame 35 is provided with a forwardly-projecting arm 46, with which engages a cam 47, mounted on the horizontally-disposed shaft 21, that is supported in bearing-brackets 49
115 on the base-plate, the operation of the cam being resisted by a spring 50, bearing at one end on a vertical post or standard 51 and at the other end on a washer 52, carried by an adjustable set-screw 53. The set-screw 53
120

passes through a threaded opening in an arm 54, projecting toward the rear of the frame 35, and when acted upon by the spring the frame is rocked on the shaft 34 and moved forward until one of the mandrels and its record are presented in proper position for the reproduction of said record. At the end of each reproduction a cam 47 acts to move the frame 35 and all of the records to the rear, so that the mandrel-carrying disk will be free to rotate without danger of injuring any of the articles. The shaft 36 is further provided with a ratchet-wheel 57, having a number of teeth corresponding to the number of mandrel-shafts, and these teeth are successively engaged by a pawl 58, carried by a lever 59, the lever and pawl being connected by means of a tension-spring 60' in order that said pawl may be held in operative position. The lever 59 is mounted on a pin 60, held between bracket means 61, that project from a rearwardly-extending arm 62, secured to the frame 35, and said lever is engaged by a cam 61, carried by the shaft 48, immediately after the backward movement of the frame 35 or during such backward movement, and the pawl 58 is moved up to an extent sufficient to rotate the ratchet and record-carrying disks to the extent of a single tooth, and thus move a fresh record into position for playing.

In order to correct the movement of the pawl and insure the stopping of the mandrel-carrying disk in proper position, the shaft 36 is provided with a centering-wheel 64, having notches of a number equal to the number of ratchet-teeth, and these notches receive an anti-friction-roller 65, carried by a pivotally-mounted arm 66, that is held up in proper position by a helical compression-spring 67, extending between the rear edge of the arm and an upturned ear at the end of the arm 62. Should the movement of the pawl be greater or less than that required to present a fresh record to playing position, the entrance of the spring-pressed anti-friction-roller into one or the other of the notches of the centering-disk will correct this movement and the records will at all times be stopped in proper position. The shaft 36 further carries an annular band 68, having a plurality of spokes 69, radiating from a hub member that is secured to the shaft, and on this band are placed cards bearing the names of the several selections on the records, there being one card for each record and these being successively displayed through an opening 70, formed in a curved guard 71, that surrounds the greater portion of the card-carrying band. The title displayed is always the title of the record then in position for playing; but should the operator wish to hear another selection provision is made for the turning of the record-carrying disk until the proper title appears at the display-opening. At the front portion of the machine is a frame 73, having a pair of guiding-open-

ings for a longitudinally-movable bar 74, one end of which projects out through an opening in the front of the casing and is provided with a thumb-piece or push-button 75. This rod or bar is normally held out by means of a coiled compression-spring 76, bearing at one end against the frame 73 and at the opposite end against a collar 77, carried by the rod and held in position by a set-screw, so that it may be adjusted in order to alter the stress of the spring. The rear edge of the rod 74 is guided in an opening formed in a bracket 78, and at a point intermediate of the length of the rod is a spring-pressed pawl 79 in position to engage the ratchet-disk 57, such as when the push-rod 74 is forced inward the pawl 79 will engage a fresh tooth of the ratchet-disk and upon release of the rod the spring 76 will again force it outward, when the ratchet-disk will be advanced to the extent of a single tooth, thus presenting another record to the sound-box and displaying the title of such record at the opening 70, and in this way the operator may turn the mandrel-carrying disk to any desired extent.

The manual adjustment of the mandrel-carrying disk, as well as the automatic adjustment, can be accomplished only when the frame 35 is tilted rearward, and when the records are not in playing position the one nearest the sound-box will be at all times slightly spaced therefrom, so that there will be no danger of injury to the records by the turning of the mandrel-carrying disk. In the present instance this is accomplished by providing in the push-rod 74 a small lug or finger 80, the outer face of which is inclined, and on the rear face of the frame 73 is mounted a slidable locking-block 81, having a pair of slots 82, through which extend guiding-screws 83. This locking-block 81 has an opening 84 of a height sufficient to permit the passage of the push-rod and its lug 80; but when the locking-block is in its lowest position the upper wall of said opening will be in contact with the upper face of the rod and any inward movement of the push-rod 74 will be prevented by engagement of the lug 80 with the outer face of the block. The side of the block is provided with a pair of pins 85, between which plays an arm 86, carried by or forming a part of the cam-operated arm 46 of the frame 35. In the operation of this portion of the mechanism movement of the frame 35 to the rear or to inoperative position will move the arm 86 against the upper of the pins 85 and will raise the block 81 to an extent sufficient to permit the free passage of the lug 80 of the push-rod. When the frame is moved forward or to playing position, the arm 86 will engage the lowermost of the pins 85 and will depress the latter to an extent sufficient to prevent the passage of the lug 80, so that it will be impossible to operate the push-rod when any of the records are in engagement with the sound-box.

It is sometimes desirable to repeat a record the reproduction of which has just been finished, and for this purpose it is necessary to prevent the operation of the automatically-operating shifting-pawl 58. The frame 75 is provided with bearing-openings for the support of a pull-rod 87, the outer end of which projects through an opening in the front of the casing and is provided with a handle or pole 88. The inner end of the rod is provided with an arm extending around the rear portion of the pulley 58, and should the operator desire to repeat the record already played he will pull the repeating-rod 87 outward, and thus move the pawl 58 out of engagement with the teeth of the ratchet-disk 57, so that subsequent movement of the pawl-operating cam will be ineffectual. The upper face of the repeating-rod 87 is provided with a pair of locking-notches 90, with which may engage a spring locking-pawl 91 in order to hold the repeating-rod in adjusted position, while in order to prevent pushing inward of the rod 87 a stop-block 92 is employed.

In order to prevent excessive forward movement of the rocking frame 35 under the influence of the spring 50, a threaded stop-rod 92 is mounted in a standard 93 on the base and is provided with lock-nuts 94, which may be adjusted in order to prevent excessive movement of the frame in either direction. The pin extends through an opening formed in a flange 95, carried by or forming a part of the cam-actuating lug 46.

The shaft 21 carries a rocking frame 100, which carries at its upper end a shaft 101, extending inward within the annular series of mandrels. On the extreme inner end of the shaft is secured a friction-wheel 102, formed of or covered with rubber or other suitable material, and this friction-wheel is adapted to engage against the friction-surfaces 42 of the several mandrels as the latter are successively presented to playing position. The movement imparted to this shaft is thus transmitted through the friction members 102 and 42 to the mandrel and from thence to the gear 40, to the gears 30 and 29 for the operation of the sound-box-traversing shaft. Near the outer end of the shaft 101 is a belt-wheel 103, over which passes a belt 104, leading to a pulley 105 on a counter-shaft 106, adapted to suitable bearings under the base-plate. The shaft 106 carries a large pulley 107, that is connected by a driving-belt 108 to a pulley 109 on the armature-shaft of a motor 110, the latter being of any suitable construction. In the motor-circuit is arranged a switch 111, by means of which the current may be manually cut off, and in this circuit is connected a rheostat 112, so that more or less resistance may be cut in in order to control the speed at which the records are played. On the extreme outer end of the shaft 101 is a worm 113, which engages a worm-wheel 114 on an approximately

vertical shaft 115. This shaft is held in upper and lower bearings formed by ears projecting on one side of the rocking frame 100. At the lower end of shaft 115 is a worm 116, intermeshing with a worm-wheel 117 on the shaft 21, and the gears are so proportioned that the shaft 21 will be turned a single revolution for the reproduction of each record, the several cams on the shaft 21 being so adjusted as to operate in proper order for the movement of the several parts which they control.

In order to force the frame 100 forward, and thus keep the driving-roller 102 in frictional contact with the mandrel which it is to revolve, the frame is provided with a rearwardly-projecting arm 120, carrying a set-screw 121, on which is a collar 122, forming a bearing for a compression-spring 123. The lower end of the spring rests on a standard 124, carried by the base, and the function of the spring is to throw the rocking frame forward and maintain the friction-roller in positive engagement with the mandrel.

To one of the brackets or standards 33 is pivoted a bell-crank lever 125, having an approximately horizontal arm that is operated upon by a cam 127 on the shaft 48 and an approximately vertical arm that is connected by a link 128 to the rocking frame 100. When the cam operates on the bell-crank lever, the movement is transmitted by the link 128 to the frame 100, and the latter is thrown to the rear to an extent sufficient to move its anti-friction-wheel 102 from engagement with the mandrel, so as not to interfere with the subsequent adjustment of a fresh mandrel to playing position.

The rearward movement of the frame 100 occurs at the completion of each reproduction, and at this time it is necessary to provide for the return of the sound-box and its carriage to its initial position. For this purpose the frame 5 is provided with bearings 130 for the reception of a rock-shaft 131, having one arm, 132, adapted to engage the inner face of the disk 24. Upon the opposite end of the shaft is a rocker-arm 133, that is connected by a link 134 to the rocking frame 100, and when this frame is moved to the rear the shaft 131 will be rocked to an extent sufficient to move the arm 132 against the disk 24, and thus withdraw the pin 22 from its locking engagement with the arm 12, whereupon the weight 26 will shift the lever 9 in the manner previously described, and the carriage will be returned to initial position by means of the weight 27. This is accomplished at the same time with each of the records, the latter presumably being of exactly the same length, but in event of failure of this portion of the mechanism the rod 25, that projects from the sound-box carriage, will effect the unlocking movement of the pin 22 in order to allow the return of the sound-box.

In order that the casing may be as nearly air-tight as possible, the trumpet 135, which projects in the usual manner from the sound-box, is carried by a slide 136 of a length
5 equal at least to the length of one of the mandrels, and this slide is guided between a pair of slotted pipes 137 in the front of the casing, so that the casing will be at all times closed.

10 At a point adjacent to the main ratchet-disk is an inverted-U-shaped frame 140, to the upper cross-bar of which is pivoted a lever 141. This lever, which may be formed of any suitable material, is provided near one end with
15 a block 142 of insulating material and with a contact-strip 143, formed of copper or other good conducting material. Below the lever is arranged a block 144, carrying a pair of
20 spring-contacts 145, which form the terminals of the motor-circuit, the upper ends of said contact-strips resting against the insulating-block 142 when the parts are in operative position. The outer portion of the lever
25 passes under a guide 146, and its extreme end portion is engaged by a catch 147, pivoted on a pin 148, the tail of the catch projecting through an opening 149 into a coin-chute 150. When a coin of proper value is deposited in
30 the chute, it will in falling strike the tail of the catch and move the latter against the stress of a spring 151 to releasing position. A spring 152, secured to the front end of the lever 141, then shifts the position of the lever
35 until the contact-spring 143 engages the two contacts 145 and establishes the motor-circuit, after which the parts continue to operate until the record has been reproduced, and at the completion of this operation the
40 current will be broken and the motor stopped.

45 The front bar of the frame 140 is provided with a pair of guides 153 for the reception of a vertically-movable bar 154, normally held in alined position by a helical compression-spring 155. The upper end of the bar 154
50 carries a pawl 156, from which projects an inclined tongue or cam 157, adapted to engage against a set-screw 158, carried by a lug projecting from the frame, and the pawl is normally held in such position that the tongue
55 will engage this screw by means of a spring 159, carried by the pawl and bearing against the main body of the bar. The parts being normally in the position shown in Fig. 8, downward movement of the frame of the bar
60 and the cutting in of the motor will not be interfered with. Near the completion of the reproduction of the record a cam 160 on the cam-shaft 48 will engage a lug 161, projecting from the bar, and will depress the same
65 until the approximately horizontal shoulder of the pawl is below the end of the lever 141. After a short time the cam 160 will pass beyond the lug 161 and release the same, whereupon the spring 155 will elevate the bar 154 and the pawl will raise the lever 141 until the

rear end of said lever is again engaged by the catch 147 and locked in position with the circuit broken. Continued upward movement of the pawl will cause the tongue 157 to ride
70 against the end of the screw 158, and said pawl will be moved outward from engagement with the lever 151, leaving all of the parts in proper position for a subsequent operation.

In order to prevent the manipulation of the machine by slugs or coins of a diameter less
75 than of a standard coin, such as a nickel, the coin-slot is divided into two branches 150 and 163, these being divided by a partition 164, a portion of which is curved or inclined and is provided with a slot 165 of a width but
80 slightly less than that of the standard coin. If a coin of smaller denomination or a slug or other article of less diameter than a standard coin is inserted in the slot, it will pass through the opening 165 to the branch 163
85 of the coin-chute and will be deposited in the coin-receptacle or in a different receptacle without, however, operating the machine.

The operation of the machine in brief is as follows: When a coin of proper denomination
90 is inserted in the coin-chute, it will strike the catch 147 and move the same to release the lever 141, whereupon the latter will move until the contact-strip 143 engages the contacts 145 and closes the motor-circuit. The first
95 operation is to move the operating-cam of rocking frame 35 from contact with arm 46, allowing the frame to swing forward until one of the records is presented to the sound-box, and at the same time or at any time previous to this the cam 28 is operated to allow
100 the sound-box to move to record-engaging position. The rocking frame 100 then moves forward until the friction-wheel 102 is in engagement with the mandrel of the record to be played, and the movement of the motor is then transmitted to the belt-wheel 103, causing the record to revolve at proper speed. The movement of the record-mandrel is transferred through the friction-wheel 102 and
110 friction-surface 42 to the gear 30 and thence to the pinion 29 of the sound-box-traversing shaft. The operation continues until the completion of the record, and at this time the cams are so arranged that the frame 35 will first be
115 swung to the rear and the pawl-bar will be elevated to automatically shift the mandrel-carrying frame and present a fresh record to playing position. Immediately following this operation the rocking frame 100 will move
120 from the rear and the rock-shaft 131 will be turned until arm 132 forces the disk 24 outward and releases the locking-pin 22. This permits the weight 27 to restore the sound-box and sound-box carriage to initial position.
125 The only further movement necessary is for the cam 160 to operate the bar 154 and through the pawl 156 restore the circuit-controlling lever 141 to its initial position.

On the end of the shaft 48 is connected a 130

counter 166, so arranged as to accurately register the number of operations of the machine, said shaft turning once during the reproduction of each record.

5 Having thus described the invention, what is claimed is—

1. In a sound-reproducing machine, a record-carrier, a sound-box, and means for automatically moving both in directions away from each other at the completion of a reproducing operation.

2. In a sound-reproducing machine, a plural record-carrier, a sound-box, means for automatically moving both members away from each other at the completion of a sound-reproducing operation, and means for moving the members toward each other in advance of the starting of a reproducing operation.

3. The combination with a sound-reproducing machine, of a sound-box, a plural record-carrier, a rocking frame carrying the same, and means for moving said frame.

4. In a sound-reproducing machine, the combination with a sound-box, of a plural record-carrier, a pivotally-mounted frame supporting the same, and a cam for moving the frame away from the sound-box.

5. In a sound-reproducing machine, a plural record-carrier, a pivotally-mounted frame supporting the same, a cam for moving the frame away from the sound-box, and a spring tending to move the frame in the direction of the sound-box.

6. In a sound-reproducing machine, a sound-box, a plural record-carrier, a spring operating to move said carrier in the direction of the sound-box, and means for limiting the movement of the carrier.

7. In a sound-reproducing machine, a sound-box, a sound-box-traversing mechanism, a plurality of record-carrying mandrels, and a mandrel-support movable bodily toward and from the sound-box and revoluble to present any of the mandrels in operative relation to said sound-box.

8. In a sound-box-reproducing machine, a sound-box, a sound-box-traversing mechanism, a plurality of record-carriers adjustable to reproducing position, actuating means for engaging and revolving the successive carriers as they are brought to reproducing position, and means for transmitting movement to the sound-box-traversing mechanism from the revolving carrier.

9. The combination with a sound-box and sound-box-traversing mechanism, of a record-carrier movable bodily toward and from the sound-box, and gearing connections between the carrier and traversing mechanism, the intermeshing of the gears being accomplished by the movement of the carrier in the direction of the sound-box.

10. In a sound-reproducing machine, a sound-box, a sound-box-traversing mechanism, a record-carrying mandrel movable from

and toward the sound-box, and gearing connections between the mandrel and traversing mechanism, such gearing connections being meshed by movement of the mandrel in the direction of the sound-box, and disconnected by movement in the opposite direction.

11. In a sound-reproducing machine, a record-carrying mandrel, a sound-box, means for moving the mandrel toward and from the sound-box, means for transmitting movement from the mandrel to the sound-box-traversing mechanism, and means for revolving the mandrel.

12. In a sound-reproducing machine, a sound-box, a sound-box-traversing mechanism, a mandrel movable toward and from the sound-box, gearing connections between the mandrel and the traversing mechanism, a friction-disk for revolving said mandrel, and means for moving the friction-disk into and out of engagement with the mandrel.

13. In a sound-reproducing machine, a sound-box, a sound-box-traversing mechanism, a plural record-carrier including an annular series of mandrels, means for revolving the carrier to present the successive mandrels to the rear of the sound-box, and a single driving means for independently engaging the mandrels as they are successively presented to playing position.

14. The combination with a sound-box, of a plural record-carrier including an annular series of mandrels, a sound-box, means for revolving the record-carrier to present successive mandrels to playing position, a friction-disk for independently engaging the successive mandrels, and independent means carried by each mandrel for transmitting operative movement to the sound-box.

15. In sound-reproducing machines, a plural record-carrier including an annular series of mandrels, a sound-box, a means for turning the record-carrier to present successive mandrels to playing position, a friction-disk for engaging the successive mandrels, and means for moving the friction-disk toward and from said mandrels.

16. In sound-reproducing machines, a plural record-carrier including an annular series of mandrels, a sound-box, means for moving the record-carrier bodily toward and from the sound-box, means for revolving the carrier to present successive mandrels to playing position, and means for engaging and revolving the successive mandrels.

17. The combination in a sound-reproducing machine, of a sound-box, a sound-box-traversing mechanism, a plurality of record-carrying mandrels, a revolubly-mounted frame supporting said mandrels and movable toward and from the sound-box, and a revoluble friction-disk for engaging the successive mandrels, said disk being movable clear of the path of movement of the mandrels at the end of each reproducing operation.

18. In a sound-reproducing machine, a sound-box, a sound-box-traversing mechanism, a gear for transmitting movement to the traversing mechanism, and a plurality of successively-driven mandrels adjustable to reproducing position, each mandrel having a gear for intermeshing with the gear of the traversing mechanism.
19. In a sound-reproducing machine, a sound-box, a sound-box-traversing means, a plurality of record-carrying mandrels adjustable to reproducing position, of a separate means for transmitting the movement of each independent mandrel to the traversing means.
20. The combination in a sound-reproducing machine, of a sound-box, sound-box-traversing means, a plurality of record-carrying mandrels, a revoluble frame supporting said mandrels, a friction driving roller or disk for engaging each mandrel as it is adjusted to reproducing position, and independent means for adjusting the positions of the frame and the friction driving-roller.
21. In a sound-reproducing machine, a revoluble frame, a plurality of record-carrying mandrels on said frame, a ratchet-wheel connected to the frame, a manually-operable pawl for engaging the teeth of the ratchet-wheel, and means for locking said pawl from movement during a reproducing operation.
22. In a sound-reproducing machine, a revoluble frame, a plurality of record-carrying mandrels supported thereby, a ratchet-wheel secured to the frame, a manually-operable pawl for engaging the teeth of the ratchet-wheel, a pawl-carrying bar, and means for locking the pawl-carrying bar from longitudinal movement during a reproducing operation.
23. In sound-reproducing machines, a revoluble frame, a plurality of mandrels supported by the frame, a ratchet-wheel connected to the frame, a longitudinally-movable pawl-carrying bar, a spring for restoring the same to its initial position, a pawl carried by the bar and engaging the teeth of the ratchet-wheel, and a locking means for engagement with the bar during a reproducing operation.
24. In a sound-reproducing machine, a rocking frame, a revoluble mandrel-carrier supported by said frame, a ratchet-wheel connected to the mandrel-carrier, a longitudinally-movable pawl-carrying bar having a projecting tooth or lug, a pawl supported by the bar and adapted to engage a tooth of the ratchet-wheel, and a slidable locking-block for engagement with the lug, said block being moved to locking and unlocking positions by the rocking frame.
25. In a sound-reproducing machine, a revoluble mandrel-carrier, a ratchet-wheel connected thereto, a pawl for engaging and turning the ratchet-wheel, and a repeating bar whereby the pawl may be moved out of engagement with said ratchet-wheel.
26. In a sound-reproducing machine, a revoluble mandrel-carrier, a ratchet-wheel connected thereto, a pivotally-mounted pawl for turning the ratchet-wheel, a repeating rod or bar engaging the pawl, and means for holding said bar or rod in adjusted position.
27. In a sound-reproducing machine, a plural mandrel-carrier, a ratchet-wheel connected thereto, a pawl for engaging the teeth of the ratchet-wheel, means for operating the pawl at the completion of each reproducing operation, an auxiliary centering-disk having peripheral recesses and a spring-pressed arm engaging in said recesses and serving to stop the mandrel-carrier in proper position.
28. In a sound-reproducing machine, a plural mandrel-carrier, a ratchet-wheel connected thereto, a pawl for engaging the ratchet-wheel, a centering-disk having peripheral notches or recesses, and a pivotally-mounted spring-pressed arm arranged adjacent to the disk and carrying an antifriction-roller adapted to enter the notches or recesses.
29. In a sound-reproducing machine, a rocking frame, a revolubly-mounted mandrel-carrier supported thereby, a sound-box, means for moving the rocking frame toward and from the sound-box, a second rocking frame, a shaft supported thereby and extending within the series of mandrels, means for revolving the shaft, and an antifriction-roller carried by the shaft and adapted to engage the successive mandrels.
30. In a sound-reproducing machine, a revoluble mandrel-carrier, a rocking frame, a shaft supported thereby and extending between the series of mandrels, a friction-disk carried by the shaft and adapted to engage the mandrels as they are successively presented to playing position, means for driving the shaft, a cam-shaft, connections between the two shafts, and a record-carrier-advancing means operable from the cam-shaft.
31. In a sound-reproducing machine, a revoluble mandrel-carrier, a sound-box, a sound-box-traversing means, a rocking frame, a shaft supported thereby, a disk mounted on the shaft and adapted to engage the successive mandrels, and connecting means between the frame and the traversing mechanism whereby at the completion of a record the sound-box will be disengaged from said traversing mechanism.
32. The combination in a sound-reproducing machine, of a revoluble mandrel-carrier, a sound-box, a sound-box carriage, a screw for traversing the carriage, a threaded member supported by the carriage and engaging the screw, a rocking frame, means for connecting the same to said threaded member, a shaft carried by the frame, and a mandrel-driving means supported by said shaft.

33. In sound-reproducing machines, a sound-box, a sound-box carriage, a lever pivoted thereto and provided with a threaded portion forming a half-nut, a screw with which the threaded portion engages, a bar normally maintaining the lever in operative position, pivoted arms carrying said bar, a spring-pressed locking-pin engaging one of the arms, and means supported by the sound-box carriage for moving the pin to releasing position.

34. In sound-reproducing machines, a sound-box, a sound-box carrier, a lever pivoted thereto and provided with a threaded portion, a screw with which such threaded portion engages, a pair of pivotally-mounted arms, a bar carried thereby and engaging the lever, a spring-pressed locking-pin engaging one of the arms, a disk secured to said pin, a releasing-pin supported by the carriage and adapted to engage said disk, a weighted lever connected to the bar and tending to move the threaded

lever to disengaging position, and a cam for restoring the parts to operative position. *

35. In sound-reproducing machines, a record-carrier, a sound-box, a slotted casing inclosing the same, a trumpet connected to the sound-box and extending through the slot, and a slide movable with the trumpet and closing the slot. 25

36. In sound-reproducing machines, a record-carrier, a sound-box, a slotted casing inclosing the same, a slide fitted within the slot of the casing, and a trumpet carried by said slide. 30

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses. 35

BENJAMIN DUBINSKI.

Witnesses:

WALTER O'BRIANT,

WILLIAM SCHIMMELPFENNING.



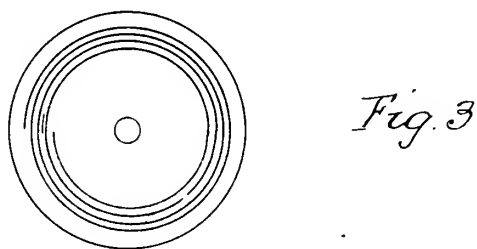
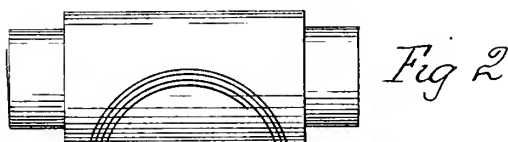
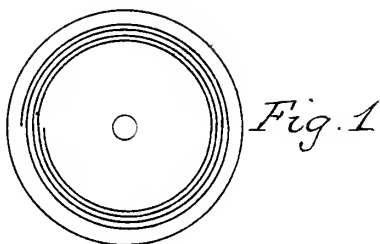
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T. A. & J. B. CONNOLLY.
METHOD OF MAKING SOUND RECORDS.

APPLICATION FILED DEC. 31, 1903.

NO MODEL.



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DISTRICT OF COLUMBIA.

METHOD OF MAKING SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 773,532, dated October 25, 1904.

Original application filed September 12, 1903, Serial No. 172,972. Divided and this application filed December 31, 1903. Serial No. 187,384. (No model.)

To all whom it may concern:

Be it known that we, THOMAS A. CONNOLLY and JOSEPH B. CONNOLLY, citizens of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in Methods of Making Sound-Reproducing Records, of which the following is a specification, this application being a division of application Serial No. 172,972, filed September 12, 1903.

This invention has relation to records for sound-reproducing machines, and has for its object the production of a tablet-record having the sound-reproducing groove impressed, indented, or milled in its surface by means of a roller or mill having formed on its surface a sound-record in cameo or relief. In producing said milled record we proceed as follows: A master plate or die of hard metal is first formed by suitably etching a helical record traced through an etching-ground by means of a stylus of a sound-recording instrument. From said master plate or die a roller or mill is then produced by rolling a cylinder or segment of softer metal upon the master-plate under such pressure as will produce upon said roller or mill a counterpart in cameo or relief of the original record. This roller or mill is then hardened or tempered and rolled upon the surface of a plate of softer metal, so as to indent or mill the surface of the latter and produce a milled facsimile of the record of the master plate or die.

In the accompanying drawings, Figure 1 is a plan view of the etched master plate or die. Fig. 2 is a side view of the roller or mill, and Fig. 3 is a plan view of a milled sound-reproducing record.

In carrying our invention into effect we use as the preferable material for the master plate or die hardened steel, and the steel may be hardened or tempered either before or after the record has been etched thereon. The master-plate is prepared for etching by having its surface smoothly finished and, if desirable, polished or burnished and then thinly coated with a suitable etching-ground in which a helical record is traced by the stylus

of a sound-recording machine. The etching is then effected by means of a suitable etching fluid and the plate cleaned off. The etched record line or groove so produced will be of substantially even depth throughout, but laterally undulating. A cylinder of soft metal is then rolled on the etched plate under sufficiently heavy pressure in a suitable press to cause the surface of the roller to take up in relief or cameo a transfer of the record from the master-plate, and thus become a "mill." The roller or mill is then hardened or tempered and rolled over a metal plate under sufficient pressure in a suitable press to indent, impress, or mill on or into the surface of said plate an intaglio facsimile of the original etched record-groove. The plate so milled by the action of the cylindrical roller or mill, as above described, constitutes the sound-reproducing record for sound-reproducing machines and may be hardened or tempered to increase its durability and impart to it other desirable characteristics, and it may be plated or otherwise treated to prevent corrosion.

Instead of using steel for the master plate or die, the roller or mill, and the sound-reproducing plate or record the master-plate may be made of steel or other hard metal, the roller or mill of a softer metal than the master plate or die, such as copper or nickel, and the sound-reproducing record-tablet of a still softer material than the roller or mill, such as tin or aluminium or a suitable non-metallic material.

If necessary or desirable, the surface of the roller or mill may be buffed or polished after receiving the record in cameo or relief without impairing its accuracy.

A large number of sound-reproducing records may be produced from a single roller or mill, and many rollers or mills may be produced from a single master plate or die.

Records according to our invention can be produced with great facility and at comparatively low cost. When made of hardened steel, they cause less wearing friction on the stylus and walls of the groove than occurs with records made of other materials. The

record-grooves are more even and accurate than those formed in soft plastic material, and, owing to the unyielding character of the material, the tone qualities are more pronounced and true.

Having described our invention, we claim and desire to secure by Letters Patent—

1. The method of making sound-reproducing records, which consists in etching a record line or groove in a metallic plate, transferring said record to a roller in relief or cameo and thereby producing a mill, and then transferring the record from the mill to a second metallic plate.

2. The method of making sound-reproducing records, which consists in producing a master-plate, having a record-line in intaglio, transferring said record in cameo or relief to a roller or mill, and transferring the record in intaglio to a second plate from said roller or mill.

3. The method of making sound-reproducing records, which consists in producing a roller or mill having a record in relief or cameo, from a plate having a record in intaglio, and then reproducing the said intaglio-record in another plate by means of said roller or mill.

4. The method of making sound-reproducing records, which consists in taking a transfer from a record-plate, having a record-groove, to a soft-metal roller or mill, then

hardening said roller or mill, then transferring the record from the roller or mill to a second plate and hardening the last-named plate.

5. The method of making sound-reproducing records, which consists in producing a roller or mill having a sound-record in cameo or relief, from a grooved plate, then finishing or polishing the surface of said roller or mill and then transferring said record in intaglio to a second plate.

6. The method of making sound-records, which consists in producing a roller or mill having a volute record on its surface and transferring said record to a disk.

7. The method of making flat talking-machine records, consisting in rolling together a rotary negative volute record, and a material to receive impressions.

8. The method of making flat talking-machine records, consisting in rolling together a cylindrical negative volute record and a material to take impressions from the said negative record.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS A. CONNOLLY.
JOSEPH B. CONNOLLY.

Witnesses:

W. E. WRIGHT,
R. W. ROME.



No. 773,617.

PATENTED NOV. 1, 1904.

A. F. WURTH.

PROCESS OF MAKING MOLDS FOR DUPLICATING PHONOGRAPH RECORDS.

APPLICATION FILED MAY 24, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

FIG. 1.

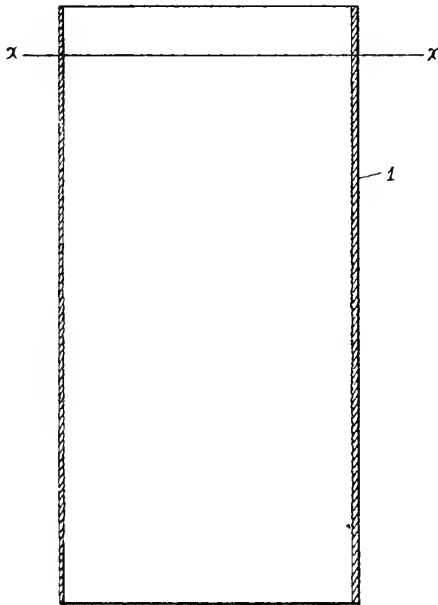


FIG. 3.

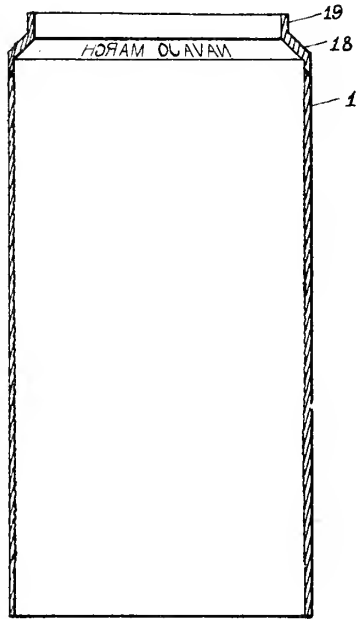
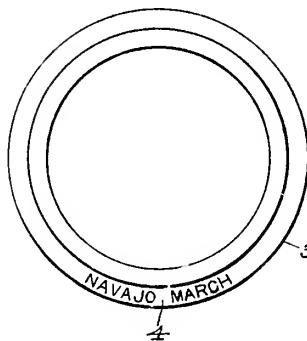


FIG. 4.



WITNESSES:

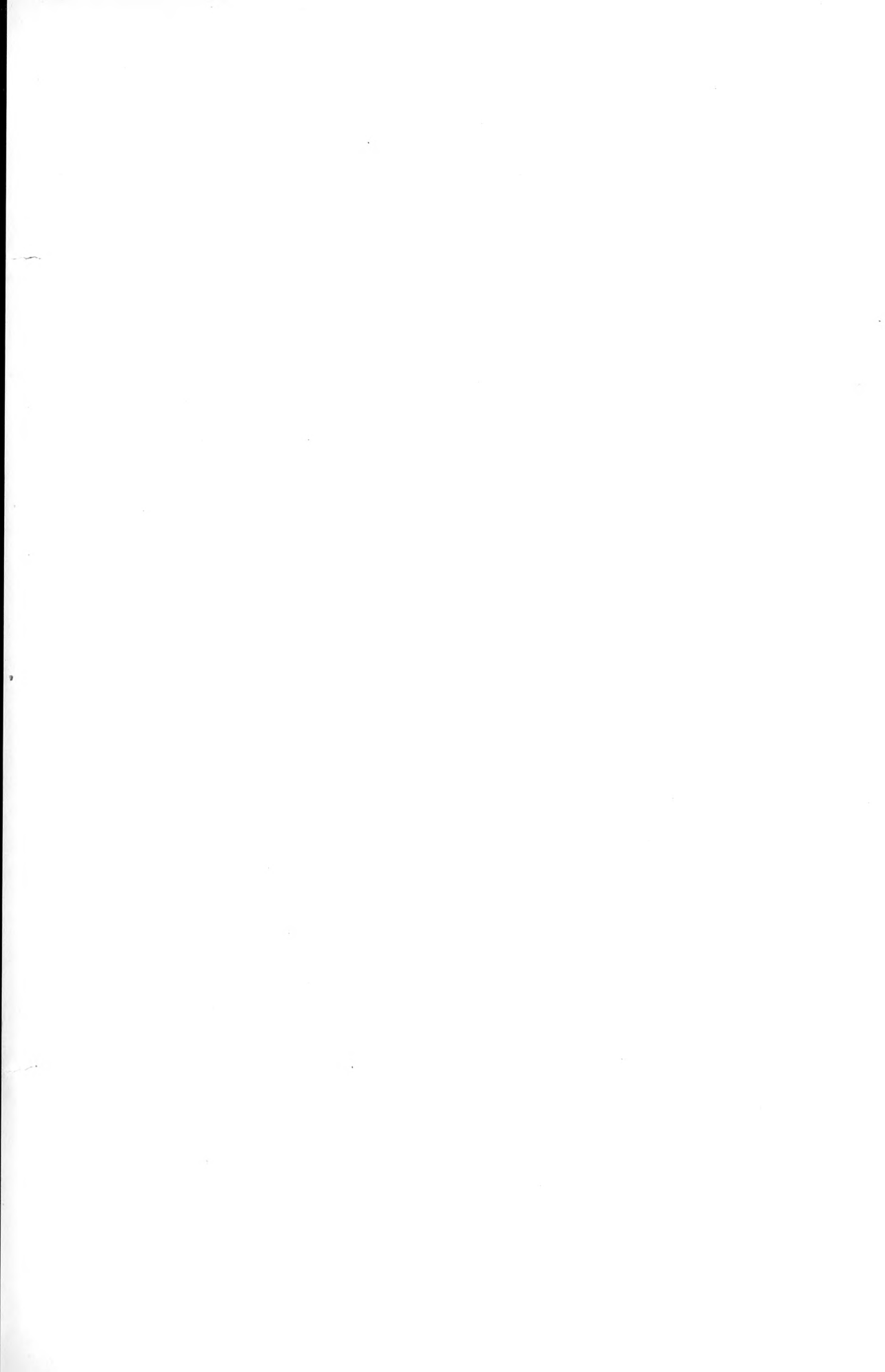
to R. Nelson
Harry S. Hutton

INVENTOR

Albert F. Wurth

BY

Frank L. Roper
ATTORNEY



No. 773,617.

PATENTED NOV. 1, 1904.

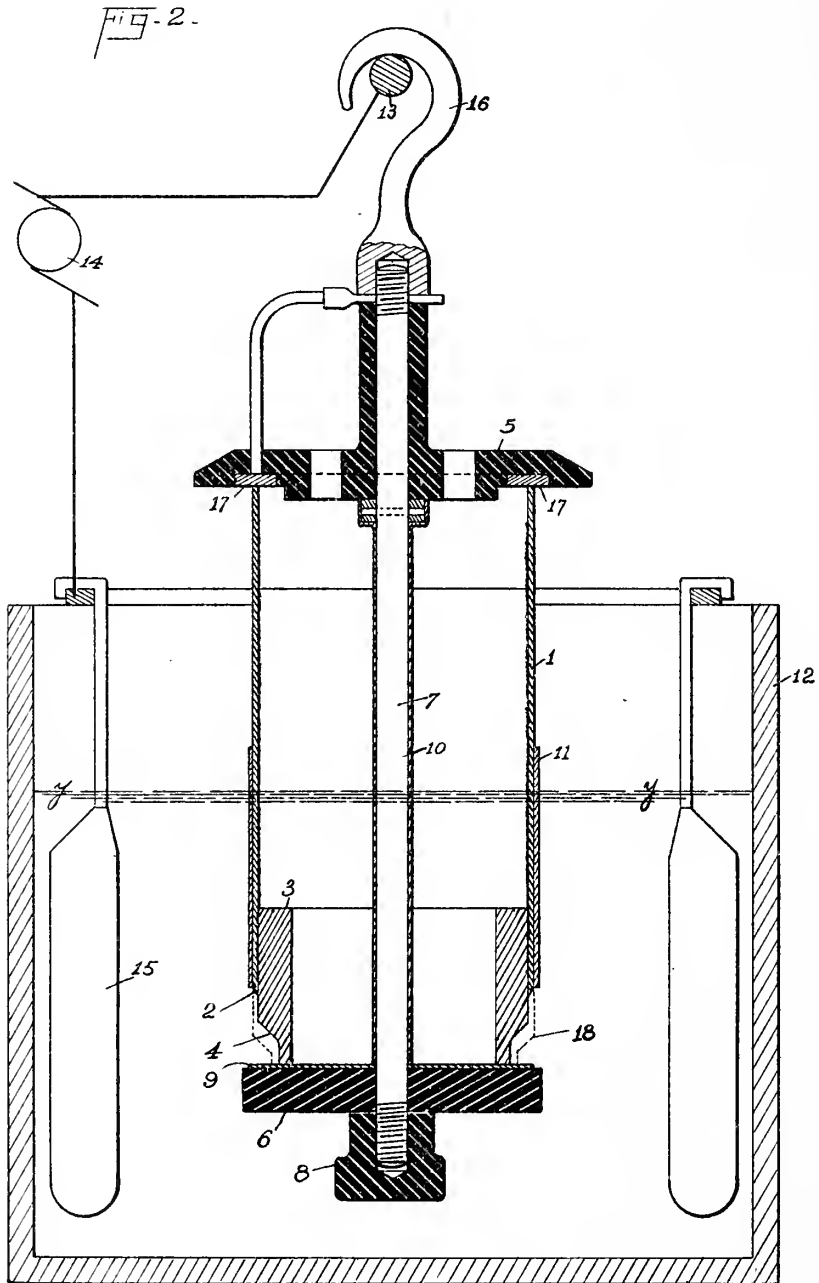
A. F. WURTH.

PROCESS OF MAKING MOLDS FOR DUPLICATING PHONOGRAPH RECORDS.

APPLICATION FILED MAY 24, 1904.

NO MODEL.

2 SHEETS—SHEET 2.



WITNESSES:

A. R. Alekin
Harry G. Walters

INVENTOR

Albert F. Wurth

BY

Frank L. Spence
ATTORNEY

UNITED STATES PATENT OFFICE.

ALBERT F. WURTH, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MAKING MOLDS FOR DUPLICATING PHONOGRAPH-RECORDS.

SPECIFICATION forming part of Letters Patent No. 773,617, dated November 1, 1904.

Application filed May 24, 1904. Serial No. 209,566. (No model.)

To all whom it may concern:

Be it known that I, ALBERT F. WURTH, of 18 Snyder street, Orange, in the county of Essex, State of New Jersey, have invented certain Improvements in Processes of Making Molds for Duplicating Phonograph-Records, of which the following is a description.

At the present time many thousand molds are in use for producing duplicate copies of phonograph-records by pressing, casting, dipping, and analogous processes well known to persons skilled in the art. These molds are in the form of cylinders generally with a very slightly tapered bore and carrying the negative representation of the record in relief thereon. It is desirable for commercial reasons that each phonograph-record should be molded with the name of the particular selection to do away with the necessity of employing separate tags or labels which frequently become lost or misplaced, and this can be done effectively only when the mold itself is provided with an intaglio of the matter which thus requires to be molded on the record. I have found that it is possible to reconstruct the modern cylindrical molds by applying an addition thereto carrying the titles of the corresponding selections, which will therefore be molded simultaneously with the production of the duplicate records and that this may be done in such a way as to show no perceptible joint with the original mold. I am thus enabled to make use of a large number of cylindrical molds now in existence which would otherwise have to be discarded and the cost of which has amounted to many thousands of dollars. Besides this considerable time would be required to make entirely new molds, while by utilizing my invention these old molds may be made over at a slight cost and in very little time.

In order that my invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a sectional view of an ordinary phonograph-mold; Fig. 2, a corresponding view illustrating the manner of con-

verting it into an improved mold wherein the name of the selection will be molded on each duplicate formed therein and showing the parts assembled in the plating-bath: Fig. 3, a similar view of the completely-finished mold, and Fig. 4 a plan view of one of the wax plugs on which the additional plating takes place.

In the views corresponding parts are represented by the same numerals of reference.

The mold 1, which is in the form of a copper shell, carries the usual negative representation of the phonograph-record on its bore. Ordinarily this mold is very slightly tapered and is generally gold-plated or nickel-plated on the record-surface to prevent oxidation. I take one of these molds and shorten it by cutting off the end on the line *x x*, and I then preferably bevel off this end to form an inclined shoulder 2, although this is not absolutely necessary. I now take a plug 3, made, preferably, of the ordinary wax-like phonographic recording material and of the shape shown, formed with the shoulder 4 slightly rounded, as illustrated. On this shoulder I preferably engrave in any suitable way the name of the desired selection, as shown in form 4, together with the trade-mark and number, if desired. Very excellent results have been secured in practice with an ordinary pantograph engraving-machine. Having prepared the plug 3 in this way the latter is fitted very accurately in the beveled end of the mold 1, and this is preferably effected by making the plug of a diameter very slightly larger than the bore of the mold and then contracting it diametrically by a reduction in temperature, so as to permit its introduction into the mold. Preferably before the plug is thus introduced it is finely coated with a very thin conducting-film—for example, of graphite or of a finely-divided metal—applied by a process of vacuous deposit. It will be also understood that this conducting-film may be applied to the plug after the latter has been introduced within the mold, although this is not so desirable, owing to the liability of not covering the entire wax surface, resulting in the formation of a joint or seam in the finished

mold, which would therefore appear in the completed duplicates. I now electroplate on the conducting-film a suitable metal to form an extension of the mold, which operation
 5 may be performed in any suitable way. For instance, the shell and plug may be clamped between two disks 5 and 6 by means of a bolt 7 and nut 8, a soft-rubber washer 9 being interposed between the disk 6 and the plug 3 to
 10 exclude the solution from the interior of the mold. In order to prevent the possibility of plating on the bolt 7, the latter is preferably covered by a rubber sleeve 10, as shown. For the same reason to prevent a deposit on
 15 the outside of the mold except on the shoulder 2 the mold is protected by a wrapping of insulated tape or of any other suitable material 11. The mold as thus equipped is supported in a plating-bath 12 from a rod 13,
 20 connected with one pole of the generator or other source of supply 14, the other pole thereof being connected to anodes 15 in the usual way.

The level of the solution is shown by the
 25 line *yy*. The hook 16, engaging the conducting-rod 13, connects with a copper ring 17, embedded in the under face of the disk 5, (the latter being usually made of hard rubber,) so as to form a connection with the source of
 30 supply 14 and to permit a deposit 18 to be formed on the conducting film or coating of the plug 3 as well as upon the shoulder 2 of the mold. The electrodeposited addition 18 becomes as intimately connected with the mold
 35 as if welded thereto, so that it may be turned off on its outside flush with the mold after the electrodeposition has been completed. The plug 3 is now removed from the mold either by shrinking it out or by breaking the plug
 40 to pieces or by melting the material thereof, after which the outside of the extension 18 and the bottom edge of the cylindrical neck 19 are trimmed off to form the complete mold, as shown in Fig. 3.

45 If in carrying the operations into effect the plug 3 has been coated with gold by a vacuum-deposit process, obviously the interior of the electroplated extension or addition will be gold-plated, and hence protected from oxidation. If, however, graphite is used for coating
 50 the plug, the entire mold may be plated on its interior with gold or nickel, or if the film on the original mold is in good condition the interior of the extension alone may be
 55 plated with gold or nickel. I find, however,

that this is not strictly necessary, since the extension does not carry any part of the record-surface, and hence it is not so important to prevent any bad effects from slight oxidation. I find that by making the mold in this
 60 way the joint between the extension 18 and the original mold 1 can hardly be detected under the microscope, nor does it result in any appreciable or audible disturbance in reproducing from records formed in the complete
 65 mold.

These molds are capable of effective use in connection with any suitable duplicating process; but they are preferably used in connection with processes wherein a molten wax-like
 70 material is introduced into the mold and allowed to set therein to take an impression therefrom, after which the finished duplicate is removed by shrinking it diametrically and removing it longitudinally, as described in patent
 75 to Thomas A. Edison, No. 667,662, dated February 5, 1901.

Having now described my invention, what I claim as new therein, and desire to secure by
 80 Letters Patent, is—

1. The process of securing an addition to a phonograph-mold, which consists in introducing a conducting-plug into the end of the mold and in electroplating a metal on said plug and
 85 on the mold, substantially as set forth.

2. The process of securing an addition to a phonograph-mold, which consists in beveling the end of the mold, in introducing a conducting-plug into the mold and in electroplating
 90 on said plug and on the beveled portion of the mold, substantially as set forth.

3. The process of securing an addition to a phonograph-mold, which consists in introducing into the mold a plug having a conducting-coating thereon and in electroplating a metal
 95 on said plug and on the end of the mold, substantially as set forth.

4. The process of securing an addition to a phonograph-mold, which consists in shrinking a conducting-plug into the end of the mold and
 100 in electroplating a metal upon said plug and upon the end of the mold, substantially as set forth.

This specification signed and witnessed this 23d day of May, 1904.

ALBERT F. WURTH.

Witnesses:

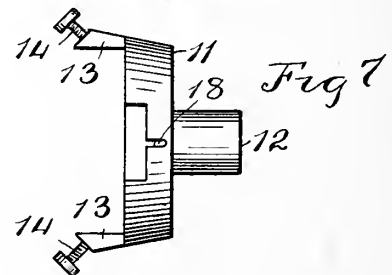
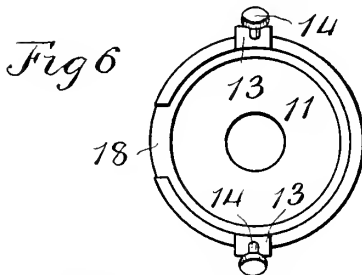
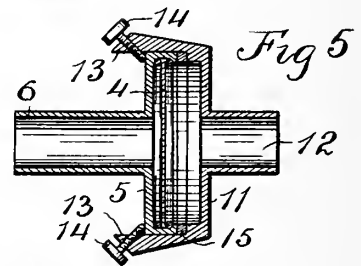
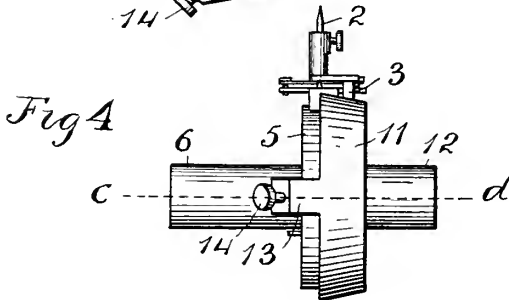
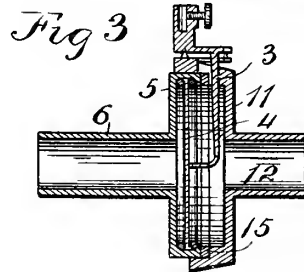
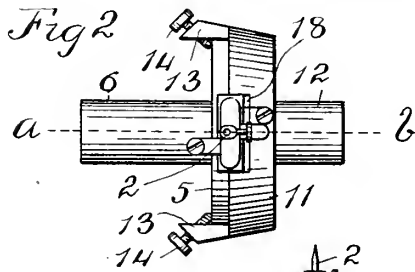
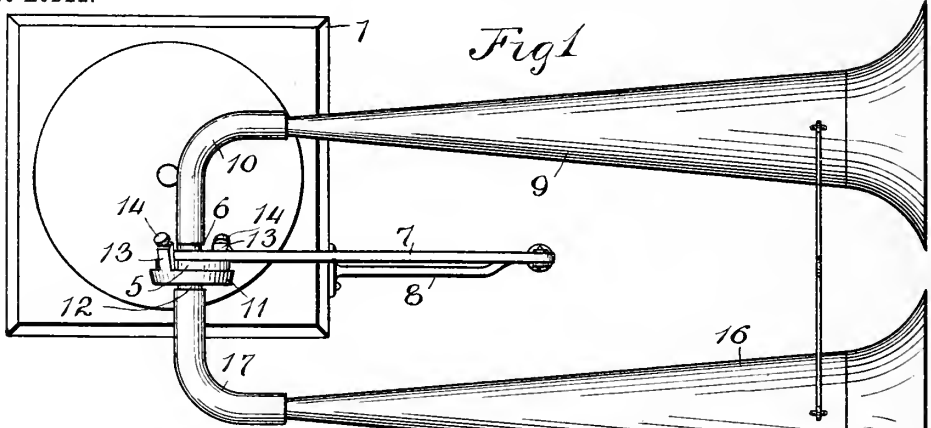
FRANK L. DYER,
 A. R. KLEHM.



C. E. HILL.
PHONOGRAPH REPRODUCER ATTACHMENT.

APPLICATION FILED MAR. 20, 1903.

NO MODEL.



Witnesses:
R. Hamilton
H. F. Wilkins.

Inventor
Charles E. Hill
 By *Warren D. House,*
His Attorney

UNITED STATES PATENT OFFICE.

CHARLES E. HILL, OF KANSAS CITY, MISSOURI.

PHONOGRAPH REPRODUCER ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 773,740, dated November 1, 1904.

Application filed March 20, 1903. Serial No. 148,776. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. HILL, a citizen of the United States of America, residing in Kansas City, in the county of Jackson and State of Missouri, have invented a new and useful Improvement in Phonograph Reproducer Attachments, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

My invention relates to improvements in phonograph-reproducers.

The object of my invention is to provide a reproducing attachment for phonographs in which the sound-waves on both sides of the diaphragm are amplified, thus increasing the volume of the sound heard by an audience listening to the phonograph.

My invention provides, further, a novel attachment that may be applied to phonographs already on the market, such as the "Columbia" graphophone, the attachment serving to gather and amplify the sound-waves made at one side of the reproducer-diaphragm and which are ordinarily dissipated, and thereby lost to the audience.

My invention provides, further, means by which the said attachment may be securely fastened to the ordinary phonograph-reproducer mechanism, the said means providing means also by which rattling or jarring between the reproducer and the attachment may be avoided.

Other novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings, illustrative of my invention, Figure 1 is a plan view of a phonograph of the gramophone type, such as the Columbia graphophone, provided with a reproducing attachment constructed in accordance with the principles of my invention. Fig. 2 is an elevation view looking at the side from which extends the reproducing-stylus of my reproducer attachment connected to the reproducer of the Columbia type. Fig. 3 is a longitudinal sectional view taken on the dotted line *a b* of Fig. 2. Fig. 4 is a side elevation view of the parts shown on Fig. 2 viewed from a point at right angles to that from which the view shown in Fig. 2 was taken. Fig. 5 is a

longitudinal central sectional view taken on the dotted line *c d* of Fig. 4. Fig. 6 is an end elevation of the attachment looking toward the open end thereof. Fig. 7 is a side elevation view of the attachment looking toward the side having the recessed rough which extends the actuating-arm of the reproducer.

Similar characters of reference indicate similar parts.

1 indicates the frame of the phonograph; 2, the stylus; 3, the actuating-arm supporting the stylus and secured at its inner end to the reproducer-diaphragm 4, secured in any desirable manner within the hollow cylindrical diaphragm-supporting member 5 of the phonograph. The member 5 is the diaphragm-support usually employed in the Columbia graphophones. It is provided with an open end and a closed end, the closed end being provided with a rearwardly-extending horizontal tubular extension 6, which serves as an outlet for the sound-waves produced by the diaphragm upon that side of the diaphragm. The member 5 is supported by a horizontal arm 7, provided at one end with a hole in which is fitted the extension 6. The other end of the arm 7 is pivotally supported by a bracket 8, secured to the side of the body 1. An ordinary horn 9 is connected by a flexible non-resonant tube 10 with the outlet or extension 6.

The mechanism just described is that of an ordinary Columbia graphophone, and further description thereof is unnecessary.

The attachment comprises the following: 11 indicates the chambered member forming part of the attachment. This member is circular in form and is provided with a closed and open end similar to member 5. It is also provided with a sound-outlet comprising a central tubular extension 12, disposed axially in line with the outlet 6. The member 11 when attached to the member 5 encircles the outer periphery of the same and is provided at the open end with two rearwardly-extending arms 13, which extend parallel with the axis of the member 5 and to the rear of the closed side of the said member. Each arm 13 is provided with an inwardly and forwardly inclined screw-threaded hole in which is fitted

a thumb-screw 14, adapted to bear upon the rear closed side of the member 5. Between the two members 5 and 11 is a resilient ring 15, forming a cushion to prevent the members rattling against each other. By adjusting the screws 14 the two members 5 and 11 may be drawn together against the pressure of the cushion 15 and securely locked in position. Another amplifying-horn 16 is connected by a flexible non-resonant tube 17 with the outlet extension 12. The horns 16 and 9 may be supported in any desirable manner. In one side of the wall of the member 11 is provided a recess 18, through which the stylus-supporting arm 3 may extend.

In order to attach my attachment to the kind of a phonograph described, it is but necessary to place it with the open end against the open end of the member 5, with the arms 13 extending to the rear of the closed side of the member 5. The screws 14 are then adjusted so as to bear against the rear side of the member 5. By turning the screws 14 properly the member 11 may be forced tightly against the cushion 15. With the horns 9 and 16 in position as described sound-waves made by the diaphragm upon each side thereof are carried by the extension-outlets 6 and 12 through the tubes 10 and 17 into the horns 9 and 16, in which the sound-waves are amplified and the reproduced sounds heard with much more than their ordinary loudness. The tubes 10 and 17 being flexible permit the horns to be moved to any desired position independently of each other and being non-resonant the tubes do not readily conduct to the horns scratching or rattling sounds from the machine.

My invention may be modified in various ways, so as to be capable of application to phonographs of different styles. The member 11 may be manufactured and sold as an article of manufacture which can be readily applied to the reproducing mechanism for which it is adapted to be used.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a phonograph-reproducer, the combination with the reproducer-diaphragm, of a chamber inclosing the same, the said chamber being provided with two outlets for sound, one at each side of the diaphragm, and two separated sound-amplifying horns connected flexibly one with each of said outlets.

2. In a phonograph-reproducer, the combination with two chambered members each provided with an outlet for sound-waves, of means for releasably securing the said two members together, two separated amplifying-horns connected flexibly with the said outlets respectively, and the reproducer-diaphragm disposed in one of said members with opposite sides facing the two outlets respectively.

3. In a phonograph-reproducer, the combi-

nation with one chambered member provided with a sound-outlet, of the reproducer-diaphragm mounted in said chamber and having one side facing said outlet, a second chambered member provided with a sound-outlet disposed adjacent to the opposite side of said diaphragm, a resilient cushion between the two said members, means for securing said members together, and two separated horns connected flexibly respectively with the said outlets.

4. In a phonograph-reproducer, the combination with two chambered members adapted to receive between them the reproducer-diaphragm and provided each with a sound-outlet, the said outlets being disposed respectively one at each side of the diaphragm, of a resilient cushion between the two members, means for adjusting the two members toward each other against the pressure of said cushion, and two separated amplifying-horns connected flexibly respectively one with each of said outlets.

5. In a phonograph-reproducer, the combination with a chambered member provided with a sound-outlet, of a second chambered member provided with a sound-outlet and a plurality of arms adapted to embrace the first member, a plurality of adjusting-screws disposed one in each of said arms and arranged to engage the first member and draw the two members toward each other when the screws are properly turned, a diaphragm disposed between the said outlets, and a resilient cushion disposed between the two members.

6. In a phonograph-reproducer, the combination with the reproducer-diaphragm, of a chamber inclosing said diaphragm and having two outlets for sound, one at each side of the diaphragm, two amplifying-horns movable independently of each other, and two flexible tubes connecting the two horns to the two sound-outlets respectively.

7. In a phonograph-reproducer, the combination with a chambered member provided with a sound-outlet, of a diaphragm disposed opposite said outlet, a second chambered member provided with a sound-outlet disposed opposite the other side of said diaphragm and adapted to be secured to one side of the first member and provided also with two rearwardly-extending arms, two adjusting-screws disposed one in each of said arms and adapted to engage the other side of said first member, a resilient cushion disposed between the two members, and means for amplifying the sound-waves emitted from the two said outlets.

8. In a phonograph-reproducer, the combination with a chambered member having one open and one closed side and having a sound-outlet in the closed side, of a second chambered member also provided with an open side disposed adjacent to the open side of the other member and having a closed side

provided with a sound-outlet, the second member being also provided with two rearwardly-extending arms projecting beyond the rear side of the first member, two forwardly and inwardly inclined screws disposed one in each of said arms and adapted each to bear against the rear closed side of the first member, a reproducer-diaphragm disposed with its sides opposite the two outlets respectively, and means for amplifying the sound-waves emitted from the said outlets.

9. In a phonograph-reproducer, the combination with the reproducer-diaphragm, of a chamber inclosing the same and having two sound-outlets, one at each side of the diaphragm, two sound-amplifying horns, and two flexible tubes connecting the two horns and the two outlets respectively.

10. In a phonograph-reproducer, the combination with two chambered members provided each with a closed and an open side, the open sides of the said members being disposed toward each other and the closed side of each member being provided with a sound-outlet, one of said members encircling the outer periphery of the other member, the outer of said members being provided with a plurality of arms extending past the inner member, a plurality of inwardly and forwardly inclined screws disposed one in each of said arms and bearing against the rear side of the inner member, a resilient cushion between the two members, a diaphragm disposed between the two said outlets, and means for amplifying the sound-waves emitted from said outlets.

11. In a phonograph-reproducer, a repro-

ducing-chamber provided with an open and a closed end, the closed end being provided with a tubular extension open at both ends, and two arms extending from the open side of the chamber parallel with the axis thereof and provided each with screw-threaded holes disposed one in each arm and inclining inwardly toward the axis of the chamber.

12. In a phonograph-reproducer, the combination with two chamber members provided each with a sound-outlet, of a resilient cushion between the two chambers, means for forcing the two chambers toward each other against the pressure of the said cushion, two sound-amplifying horns, and two flexible tubes connecting the two horns with the two outlets respectively.

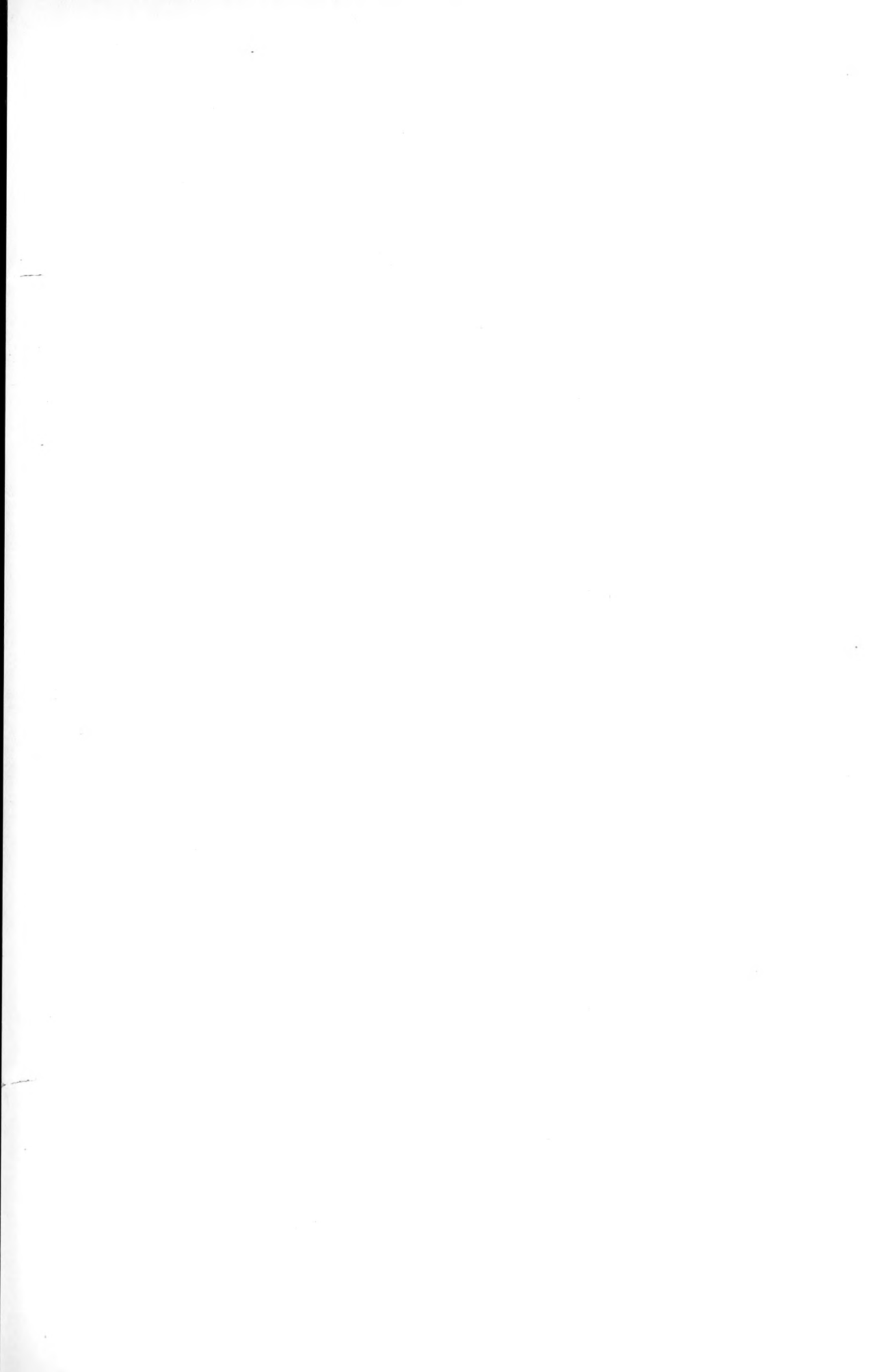
13. In a phonograph-reproducer, the combination with two chamber members provided each with a sound-outlet, and one of which is provided with a plurality of arms which embrace the other member, a plurality of screws disposed one in each arm and arranged to engage said other member and draw the two members toward each other when the screws are properly turned, a diaphragm disposed between the two members and between the outlets thereof, and two sound-amplifying horns connected respectively to the two said outlets.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES E. HILL.

Witnesses:

WARREN D. HOUSE,
HENRY F. ROSE.



No. 773,801.

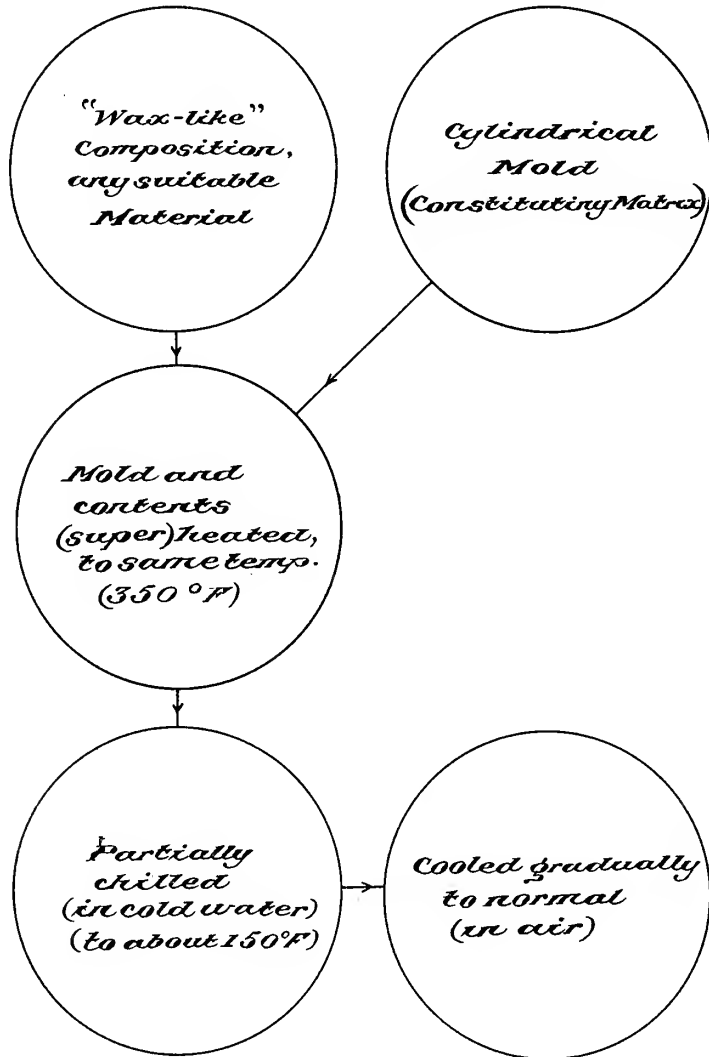
PATENTED NOV. 1, 1904.

T. H. MACDONALD.

PRODUCTION OF SOUND RECORDS OR SIMILAR ARTICLES.

APPLICATION FILED MAR. 12, 1904.

NO MODEL.



Witnesses
Frederick A. Holton
Gustave R. Thompson.

Inventor
Thos. H. Macdonald
by
Mauers Cameron Lewis & Massie
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT. A CORPORATION OF WEST VIRGINIA.

PRODUCTION OF SOUND-RECORDS OR SIMILAR ARTICLES.

SPECIFICATION forming part of Letters Patent No. 773,801, dated November 1, 1904.

Application filed March 12, 1904. Serial No. 197,865. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in the Production of Sound-Records or Similar Articles, which is fully set forth in the following specification.

The present invention is an improvement in casting tubular or other bodies (sound-records or blank tablets) of wax-like or other material for use in the talking-machine art. There is a related process invented by me and described in Reissue Patent No. 12,095, dated March 10, 1902, for molding sound-records, which process consists in superheating the sound-record composition (commonly known in the art as "wax") after it has been introduced into the mold, and chilling it down from the superheated temperature.

The present invention is particularly advantageous when applied to a process wherein the wax is superheated, but is also applicable to any process wherein the molded article is chilled or reduced in temperature.

According to my present invention the mold containing the wax is heated, (preferably superheated,) as heretofore, the casting in the mold is then suddenly and symmetrically chilled from the exterior, as heretofore, except that the temperature is not reduced to normal by this first chilling operation, and, finally, the casting (having its temperature already reduced) is gradually cooled to normal and is then readily removed from the mold.

In carrying out the process set forth in my said reissue patent it sometimes happens that the sudden or severe chilling when carried too far has the effect of warping or otherwise injuring the cast record. The object of the present invention is mainly to overcome or avoid this difficulty.

In the preferred mode of carrying out my present invention the mold containing the wax-like material is superheated, and the mold and the limpid wax therein are brought to substantially the same temperature. Of course the mold may be heated first and the

wax then poured in, or the mold may be superheated after the wax is in place, or the admission of the wax and the heating of the material may go on simultaneously. With the molds and "wax-like material" now in use I have found a temperature of about 350° to 375° Fahrenheit to give good results.

The two-step cooling process is satisfactorily carried out as follows: The heated mold containing the wax of about the same temperature is placed in cold water or is subjected to the action of cold water upon its exterior, care being taken that the water shall not act upon the wax within the mold and shall not very appreciably exert its cooling effects upon the interior or bore of the casting. This accomplishes the sudden and symmetrical chilling referred to in my said reissue patent as giving a good surface to the cast sound-record or other article, and this step is discontinued when the wax is chilled down to a point where it is in a plastic state, having a consistency about equal to very stiff putty. With the material now in use the water-cooling step may be continued for about five minutes, (if the wax has been heated to about 375° Fahrenheit,) at the end of which time the interior of the wax casting will be of a temperature of about 150° Fahrenheit, though its outer surface would of course be practically as cool as the mold. At this point the mold containing the casting is removed from the water-cooling treatment and is set in a cool-air draft, furnished by a rapidly-running electric fan, or the mold with its casting is otherwise subjected to a more gradual cooling effect. The air-cooling treatment reduces the temperature of the casting quite rapidly, though not so fast as the water would do. Employing the present record material, I find from five to seven minutes of air cooling is sufficient to complete the cooling of these molded articles. At the end of this time they may be lifted from the mold without any difficulty.

The material employed in carrying out this invention is preferably the composition described in my Patent No. 606,725, dated July 5, 1898, to which may be added a small amount

of carnauba-wax or other hardening substance.

The drawing annexed hereto for convenient reference represents the successive steps in my process of casting sound-records. I have set forth these steps with some particularity; but the invention is not limited to the precise forms and details disclosed.

Having thus described my invention, I claim—

1. The process of casting by means of a mold, which consists in raising the mold and its contents to above normal temperature, then rapidly chilling the same but not to normal temperature, and finally gradually cooling same to normal temperature.

2. The process of casting by means of a mold, which consists in raising the mold and its contents to a higher temperature, then rapidly and symmetrically chilling the same from the exterior but not to normal temperature, and finally gradually cooling the same to normal temperature.

3. The process of molding sound-records or blank tablets, which consists in first superheating the mold and its contents and then cooling the same by a two-step process, the first step being sudden and the second being gradual.

4. The process of molding sound-records or blank tablets, which consists in first raising the mold and the wax composition therein to a temperature of about 350° Fahrenheit, then chilling the same rapidly to a temperature of about 150° Fahrenheit, and finally reducing the temperature more gradually to normal.

5. The process of molding sound-records or blank tablets, which consists in giving the

mold and its wax-like contents a temperature of about 350° Fahrenheit, then rapidly and symmetrically chilling the same from the exterior to about 150° Fahrenheit, and finally reducing the temperature gradually to normal.

6. The process of molding sound-records or blank tablets, which consists in first superheating the mold and its contents to about the same temperature, second rapidly chilling the same from the outside until the contents have become plastic and of about the consistency of very stiff putty, and finally reducing the temperature gradually to normal.

7. The process of molding sound-records or blank tablets, which consists in first superheating the mold with its contents, then chilling the same by the action of water but not as low as normal temperature, and finally chilling the same by air to normal temperature, substantially as described.

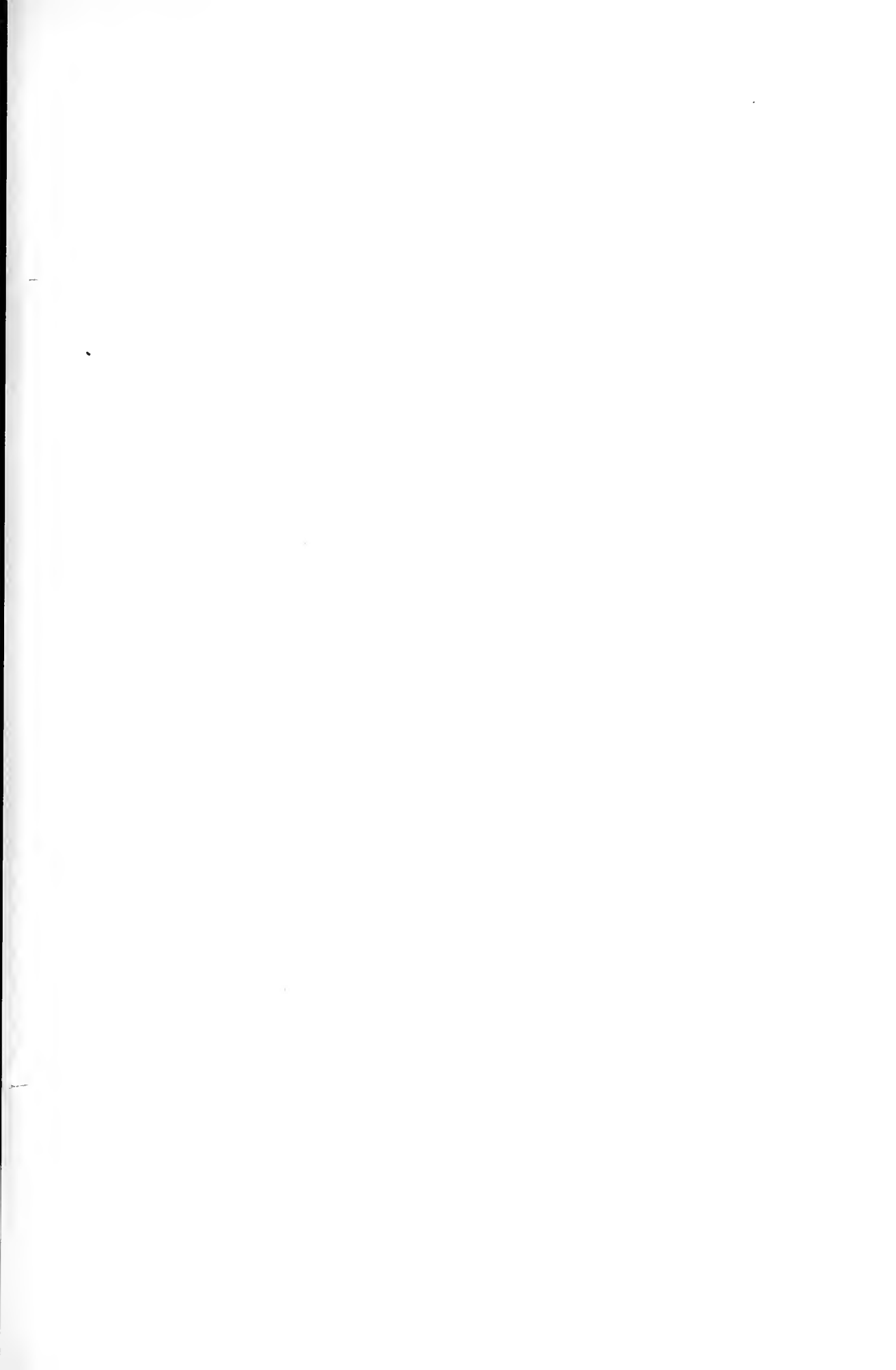
8. The process of molding sound-records or blank tablets, which consists in first having the mold of approximately the same temperature as the molten material therein, then rapidly and symmetrically chilling the same from the exterior to a temperature below the melting-point of the contents of the mold, then reducing the temperature of the same gradually to normal, and finally removing the cast article from the mold.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

M. A. SPALDING,
C. A. GIBNER.



No. 773,978.

PATENTED NOV. 1, 1904.

A. N. PETIT.

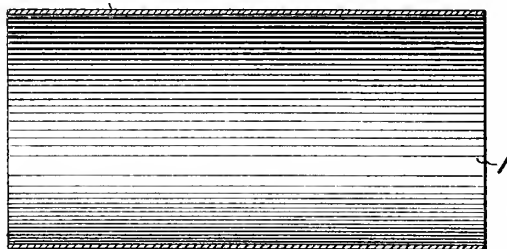
PROCESS OF MANUFACTURING CELLULOID CYLINDERS FOR RECEIVING
PHONOGRAPHIC RECORDS.

APPLICATION FILED MAR. 25, 1903.

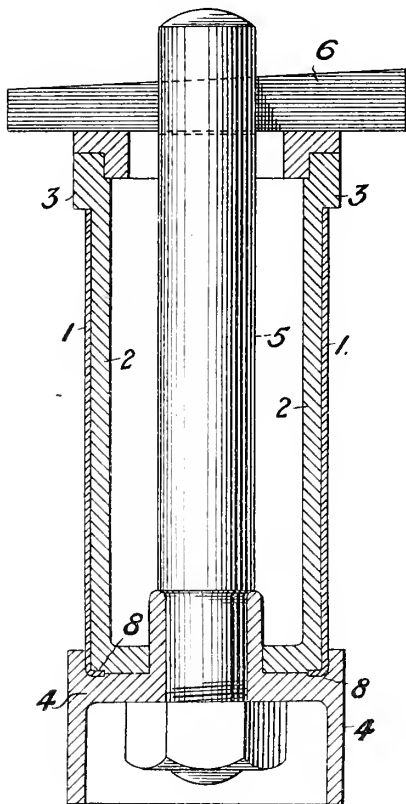
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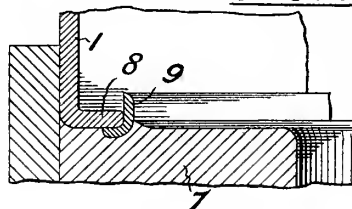
—FIG:1.—



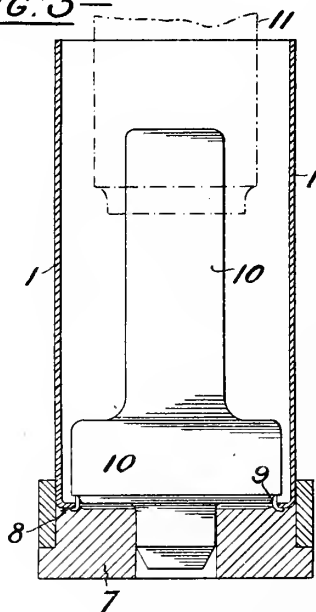
—FIG:2.—



—FIG:4.—

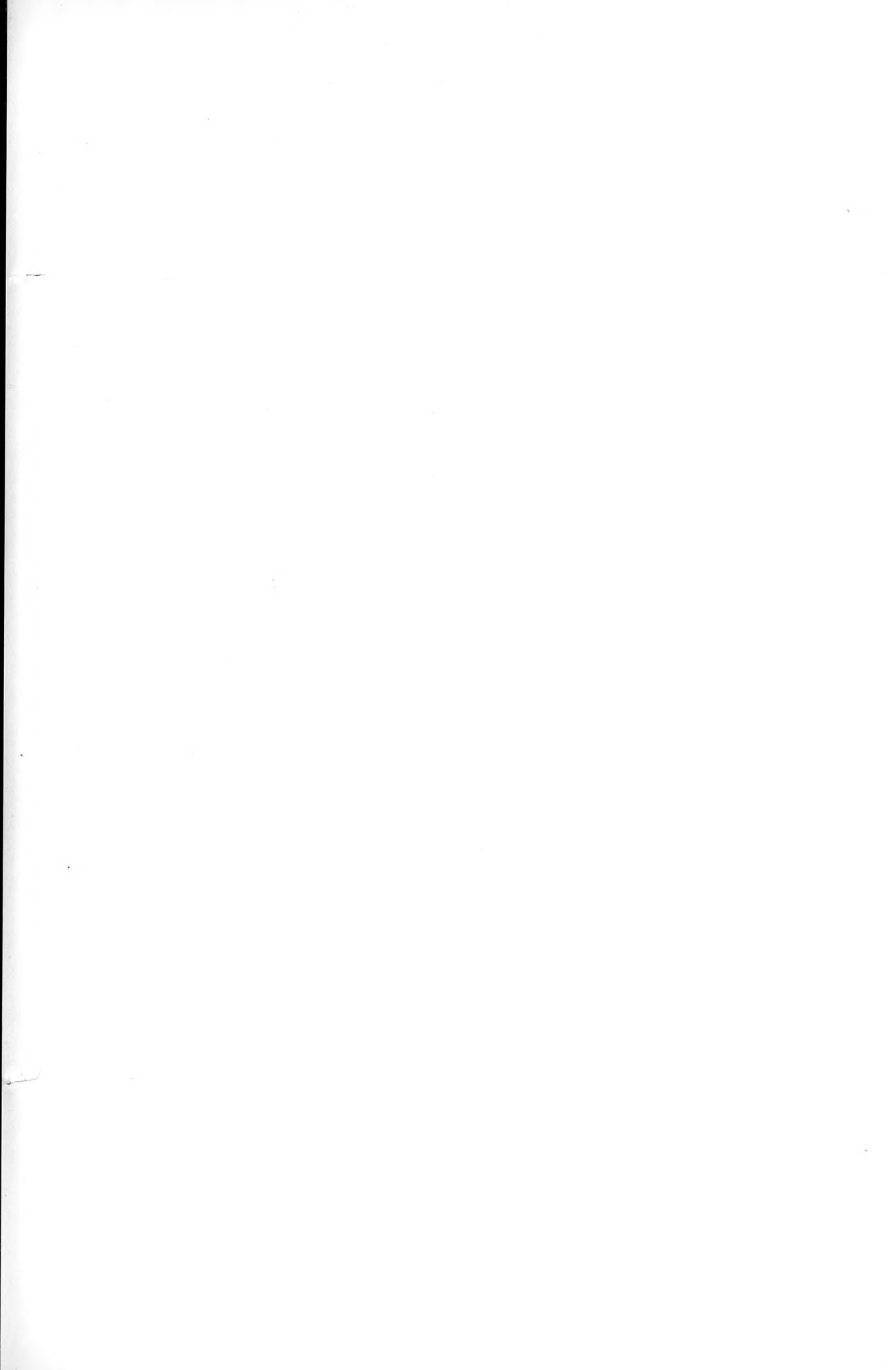


—FIG:3.—



Witnesses
Charles Smith
J. Staib

Inventor
Ademor N. Petit.
per Harold Serrell
att'y



A. N. PETIT.

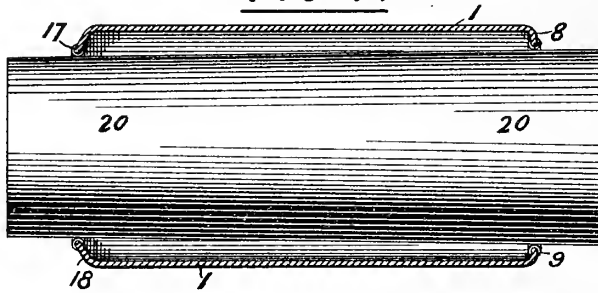
PROCESS OF MANUFACTURING CELLULOID CYLINDERS FOR RECEIVING
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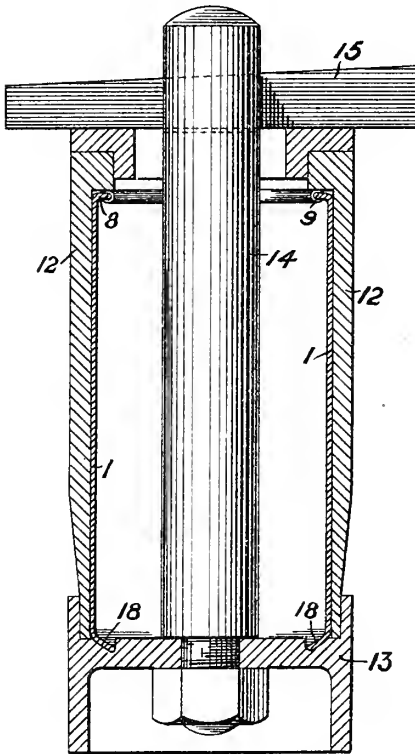
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2 SHEETS—SHEET 2.

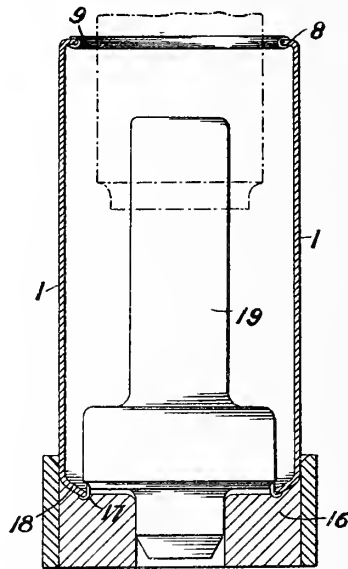
— FIG. 7. —



— FIG. 5. —



— FIG. 6. —



Witnesses

Chas. N. Smith
J. Staib

Inventor

Adenor N. Petit.
per Harold Lurell atty

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF WATERLOO, NEAR LIVERPOOL, ENGLAND.

PROCESS OF MANUFACTURING CELLULOID CYLINDERS FOR RECEIVING PHONOGRAPHIC RECORDS.

SPECIFICATION forming part of Letters Patent No. 773,978, dated November 1, 1904.

Application filed March 25, 1903. Serial No. 149,473. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR N. PETIT, a citizen of the United States of America, and a resident of Waterloo, near Liverpool, Lancashire, England, have invented certain new and useful Improvements in Processes of Manufacturing Celluloid Cylinders for Receiving Phonographic Records, of which the following is a specification.

Cylinders for phonograph and the like instruments which are to receive upon their exterior surface the phonographic records have latterly been composed either wholly or partially of celluloid or have consisted of a base provided with a celluloid surface to receive the record, and such cylinders have presented many advantages in use and, owing to their being practically indestructible, have retained a permanent record of the sound-waves. The formation of the record upon the surface of the celluloid cylinder is conveniently effected by inserting the celluloid cylinder within a matrix which is itself an electrotype taken from a wax cylinder in which the records have been cut by the recording-stylus of the phonograph. The celluloid cylinder having been suitably inserted in the matrix is subjected to internal pressure and heat, and thereby expanded against the internal surfaces of the electrotype-matrix, from which it (the celluloid cylinder) receives the requisite impression and reproduction of the record.

Now this invention treats of record-cylinders which are formed wholly of celluloid, the walls of the tube being of sufficient thickness for strength and the internal diameter somewhat greater than the diameter at any point of the mandrel which is to carry the celluloid record-cylinder. In order to adapt such cylinders composed wholly of celluloid to frictionally fit upon the mandrel when slid thereon, so that the outer cylindrical surface is concentric with the axis of the mandrel and so that the celluloid record-cylinder shall occupy its required position in the longitudinal direction of the mandrel, it is necessary that the cylinder should be provided with a collar at each end having different-sized apertures and that the circular apertures of the collars shall accurately fit at all times upon the differ-

ent diameters of the mandrel with which they are brought into contact, and to this end I have described in my prior United States Patent specification, No. 666,937, a celluloid record-cylinder having one end inwardly bent—viz., that end which is to fit onto the large end of the mandrel—and the other end of the record-cylinder I have shown fitted with a ring of celluloid formed separately and then suitably cemented in its place. In the specification of an earlier United States Patent, No. 657,956, granted to myself, however, I have described as a new article of manufacture a celluloid record-cylinder in which both end parts are formed by inwardly bending a portion of the two ends of the cylinder, so that what I have termed the “collars” are made integral with the body of the record-cylinder. Obviously and as explained in this specification the two inwardly-extending ends must vary in diameters, so that the internal edges of the bent-in ends shall have the proper difference of diameters to fit on the tapering mandrel which is to carry the cylinder and grip that mandrel frictionally in such a manner that the external surface of the cylinder shall be concentric throughout with the axis of the mandrel, an air-space shall be left between the outer surface of the tapering mandrel and the inner surface of the record-cylinder, while the latter shall occupy when these conditions are satisfied its correct position longitudinally upon the mandrel. Now I have found this latter construction of cylinder with integrally-bent ends is adapted for the purposes of its use; but I have since found in practice that record-cylinders so constructed with integrally-bent ends do not always properly fit on the tapering mandrels of reproducing-machines, because they are very liable to slight variations in size, the coefficient of expansion of celluloid being large, and that this slight variation is sufficient to prejudicially affect the fit of the cylinder when in the proper position upon the mandrel.

My present invention therefore refers to a method for overcoming this defect and difficulty without changing the character of construction of the cylinders—that is to say, while on the one hand still retaining the use of a cylinder constructed wholly of celluloid

with inturned ends, yet on the other hand providing that the variations in size of the ends of such a cylinder shall not affect the proper fit of the cylinder upon the mandrel.

5 To this end I provide each edge of the inturned ends with a ring of metal secured to the said edges, and these rings having a much smaller coefficient of expansion than the celluloid I have found will always fit upon the
10 mandrel in the required position, and in a patent application by myself, Serial No. 149,475, filed simultaneously with the present patent application and patented January 19, 1904, No. 750,119, I have described as a new article
15 of manufacture a phonograph-record cylinder so constructed.

My present invention refers to the process of manufacture of such celluloid record-cylinders having inturned ends with metal edges, and I will now describe my invention with reference to the accompanying drawings.

Figure 1 shows in longitudinal section a plain tube of celluloid which is to be subjected to the process hereinafter described. Fig. 2 is a longitudinal vertical section of a "core-press" for inwardly turning one end of the cylinder which is to fit onto the larger end of the mandrel. Fig. 3 shows in vertical section a base-mold and press for applying the metal edge, and Fig. 4 is a vertical section of a portion of the press shown at Fig. 3 and drawn to a greatly-increased scale. Fig. 5 is a vertical section of a case-mold in which the opposite end of the cylinder is inwardly turned to fit upon the smaller end of the mandrel, and Fig. 6 is a vertical section of a press for applying the metal edging to the inwardly-turned end of the cylinder which is of the smaller diameter. Fig. 7 is a sectional view showing a mandrel with the record-cylinder in section constructed according to this invention fitted thereon.

In carrying out the process according to my present invention I first take a plain cylindrical tube of celluloid, such as is shown at Fig. 1 and marked 1, and I first turn in that end of the cylinder 1 which is to have the larger aperture and which is to fit onto the larger end of the mandrel, and to do this I place in the celluloid cylinder 1 a hollow metal core 2, which is not heated, this part of the apparatus being shown at Fig. 2. The end of the cylinder 1 fits up against a shoulder 3 on the core 2, and the lower end projects beyond the end of such core 2. I provide a base 4, of metal, with an upstanding edge, and before application this metal base 4 is heated by, for instance, immersing it in hot water, and when so heated the base 4 is applied to the base of the cylinder 1 and the core 2. The heat of the base 4 sufficiently softens the outstanding end of the cylinder 1 so as to cause that end to be easily bent inward by the base 4, which forms a bottom mold, and between the end of the core 2 and the upper surface of the base 4 a

recess is formed in the metal to receive the end of the cylinder which is so turned inward. Pressure is then applied to force and hold the lower end of the core 2 against the base-mold 4. This is effected in the construction shown by a bolt 5 passing through the bottom mold 4 and the core 2, the upper end of the bolt being held by a cotter 6. The end of the cylinder 1 having been thus inturned and become cool it is removed from the core 2 and placed upon a base-mold 7, as shown by the vertical section at Fig. 3. This base-mold 7 is formed with an annular recess to receive a ring of metal. This ring 9 is shown also at Fig. 4, and it is first placed in position in the annular recess of the base-mold, as shown. The cylinder 1 is then placed in position on the base-mold 7, so that its inturned edge 8 lies upon the outwardly-turned lower edge of the ring 9, and an upstanding flange of the mold 7 reaches for a short distance up the exterior of the cylinder 1 at its lower end. A pressure-die 10, attached to the ram 11 of a hydraulic or other press, is then brought down through the opening of the cylinder 1 upon the upstanding edge of the metal ring 9, and the external lower edges of that die 10 are so formed that the edge of the ring 9 is turned over onto the inner surface of the end 8 of the cylinder 1, and said ring 9 firmly holds that inturned edge by pressure. The cylinder is now removed from the device shown at Fig. 3, having one end completely formed with an inturned metal ring 9 upon that edge which is adapted to fit the larger end of the mandrel, and the internal diameter of the end of that cylinder so fitted with the metal ring 9 will not appreciably vary, and consequently will always fit the mandrel when the cylinder 1 is located in the desired position thereon. The opposite end of the cylinder is now to be operated upon, and in this case where a greater length of the end is to be turned inward in order to make the internal diameter smaller than the end 8, already described, I prefer to make such inturning at an angle to the body of the cylinder. The mode adopted for turning in this end is to fit the cylinder 1 into a cylindrical casing 12, (shown in section at Fig. 5,) so that the already-formed end of the cylinder fits up against an end shoulder on the casing 12, and this latter casing is made of metal and is not heated. The casing 12, with the end of the cylinder 1 projecting, is then applied to a base-mold 13, which has been previously heated, say, to nearly the temperature of boiling water. When applied, the mold 13 has a softening effect upon the projecting end of the cylinder 1, and that end 18 adapts itself by pressure to the formation of a circular groove made in the upper face of the mold 13. In the drawings, Fig. 5, the base-mold 13 and the casing 12 are drawn together by means of a bolt 14 and a cotter 15. When the end 18 of the cylinder has been thus formed, it is removed from the appara-

tus shown at Fig. 5 and placed upon a base-
 mold 16, which is not heated. (Shown in
 section at Fig. 6.) Previous to placing the
 end 18 of the cylinder in this mold 16 a metal
 5 ring 17, such as has been described with refer-
 ence to the other end of the cylinder 1, but
 whose interior diameter is smaller than the
 ring 9, is placed in position in the mold 16, so
 that the inturned end 18 of the cylinder rests
 10 upon that ring. A die 19 is then brought
 down through the end 8 of the cylinder and
 is caused to press upon the upstanding edge
 of the metal ring 17 and to turn that edge
 outward onto the interior of the end 18 of the
 15 cylinder to cause the metal ring to grip, and
 thus the inturned edge 18 is fitted with the
 metal ring 17, which fits accurately upon the
 smaller end of the mandrel when the ring 9
 fits upon the larger end. The cylinder 1 is
 20 then removed from the device shown at Fig.
 6 in a finished condition, and when thus pro-
 vided with metallic rings gripped onto the in-
 turned edges of the cylinder the fitting of the
 cylinder onto the mandrel 20 (shown at Fig.
 25 7) is not subject to those variations in size
 which hitherto presented a very considerable
 difficulty and objection to the employment of
 such cylinders wholly formed of celluloid hav-
 ing comparatively thin walls.

30 What I claim as my invention, and desire to
 secure by Letters Patent, is—

1. The herein-described process of manu-
 facturing blank phonograph-record cylinders
 of celluloid, the same consisting in inturning
 35 that end of a plain cylindrical tube of cellu-
 loid, which is to have the largest aperture by
 the application of heat and pressure, and
 thereafter placing around the edge of said
 end a ring of metal, then inturning the other
 40 end of the cylinder which is to have the
 smaller diameter by the application of heat
 and pressure, and thereafter placing around
 the edge of said end a ring of metal.

2. The herein-described process of manu-
 45 facturing blank phonograph-record cylinders

of celluloid, the same consisting in inturning
 one end of a plain cylindrical tube of cellu-
 loid to the aperture of maximum diameter
 by the application of heat and pressure,
 forming a ring of metal of L shape in cross-
 50 section, applying the inturned end of the cyl-
 nder upon the said ring of metal and over-
 turning the opposite edge of the ring around
 the edge of said inturned end of the cylinder
 so as to strengthen and protect the inturned
 55 end of larger aperture, reversing the position
 of the cylinder, then inturning the other end
 of the tube of celluloid to an aperture of
 minimum diameter by the application of heat
 and pressure, forming a second ring of metal
 60 of L shape in cross-section and placing the
 latter inturned end upon the ring and over-
 turning the opposite edge of the ring around
 the edge of said inturned end so as to pro-
 tect the inturned end of smaller aperture. 65

3. The herein-described process of manu-
 facturing blank phonograph-record cylinders
 of celluloid, the same consisting in taking a
 plain cylindrical tube of celluloid, inturning
 one end by the application of heat and pres-
 70 sure to the aperture of maximum diameter,
 forming a ring of metal of L shape in cross-
 section, applying the inturned end of the cyl-
 nder upon the said ring of metal and over-
 turning the opposite edge of the ring around
 75 the edge of said inturned end of the cylinder
 so as to strengthen and protect the inturned
 end of larger aperture, then inturning the
 other end of the tube of celluloid by the ap-
 plication of heat and pressure, to an aperture
 80 of minimum diameter, forming a second ring
 of metal of L shape in cross-section and plac-
 ing the latter inturned end upon the ring and
 overturning the opposite edge of the ring
 around the edge of said inturned end so as to
 85 protect the inturned end of smaller aperture.

ADEMOR N. PETIT.

Witnesses:

BENTLE BENTLEY,
 H. T. CRAMER-ROBERTS.



Not Clasified Under Acoustics.

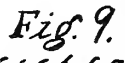
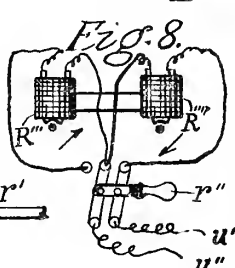
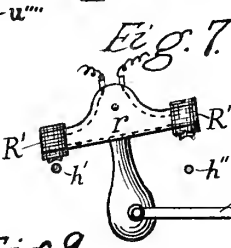
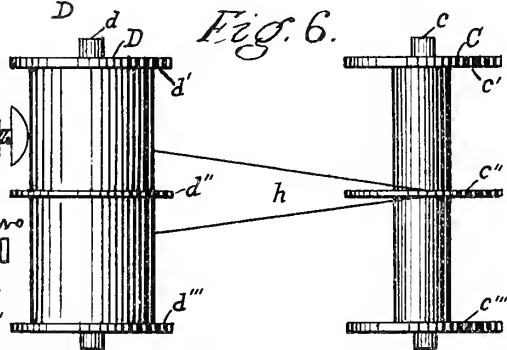
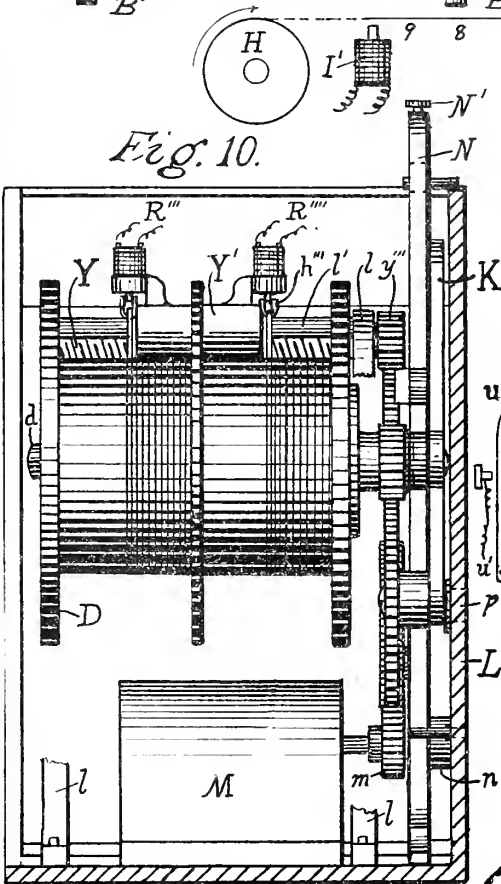
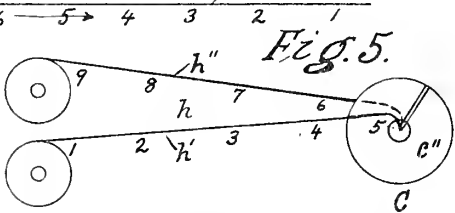
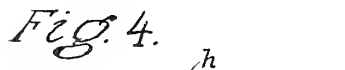
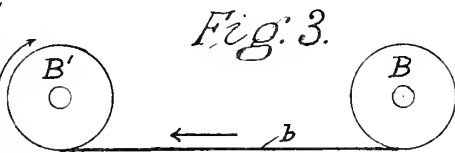
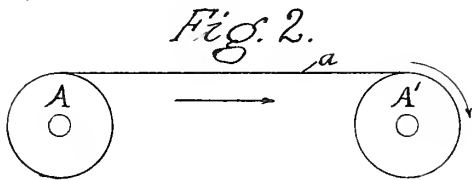
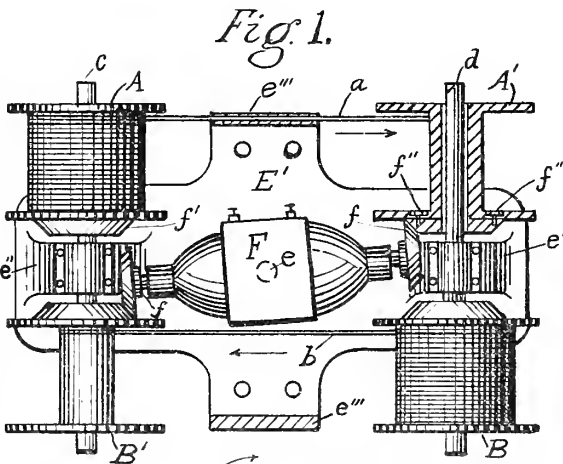
E. E. RIES.

APPARATUS FOR RECORDING AND REPRODUCING SPEECH, &c.

APPLICATION FILED FEB. 26, 1903.

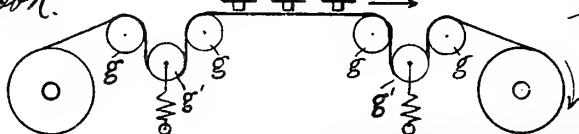
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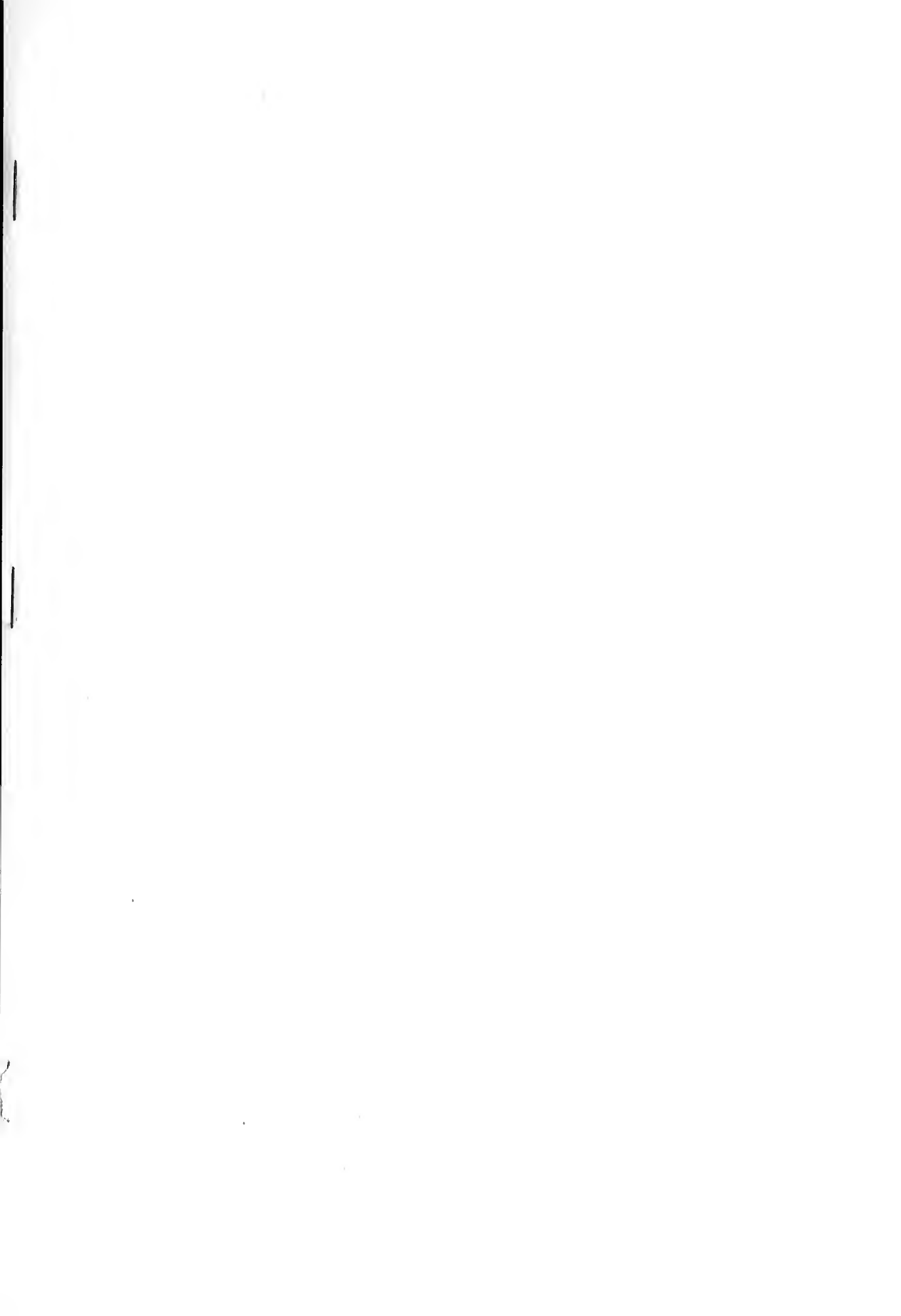
2 SHEETS—SHEET 1.



WITNESSES:
J. E. Dandon.
M. E. Bu.

INVENTOR
Elias E. Ries.





E. E. RIES.

APPARATUS FOR RECORDING AND REPRODUCING SPEECH, &c.

APPLICATION FILED FEB. 26, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 11.

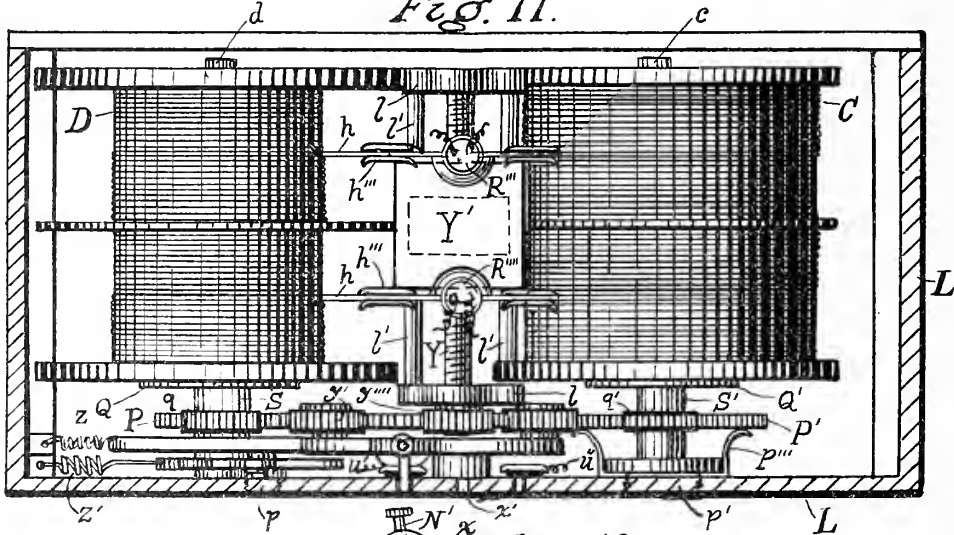
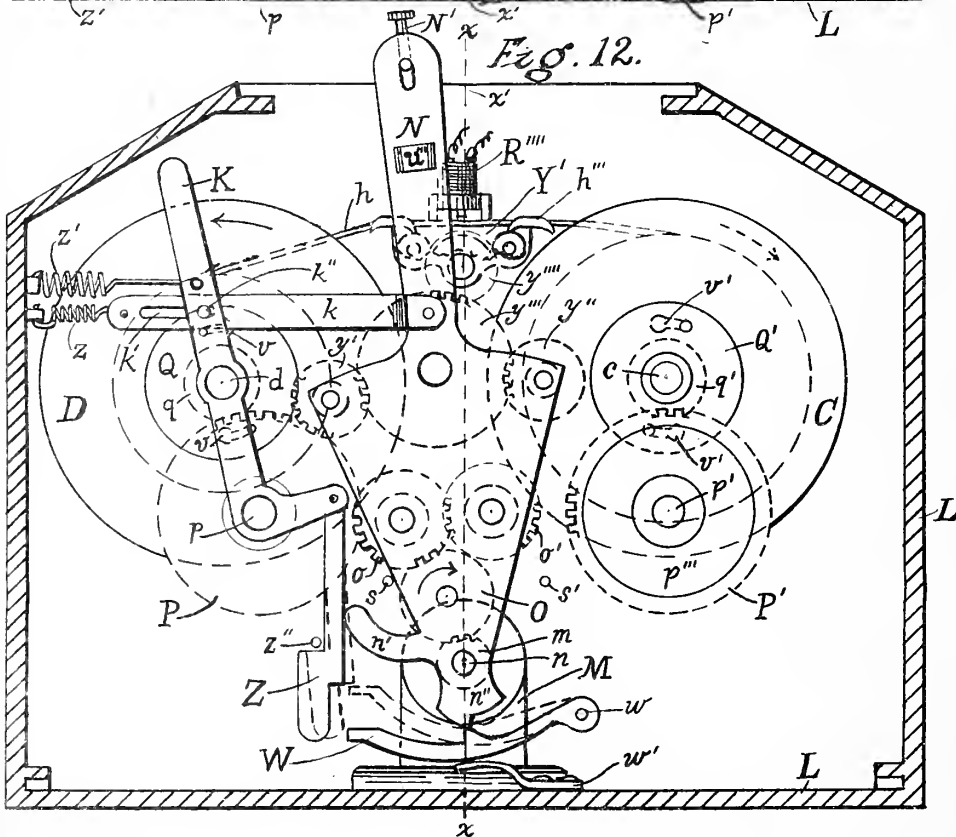


Fig. 12.



WITNESSES:

J. E. Davidson

M. E. Bell

INVENTOR

Elias E. Ries.

UNITED STATES PATENT OFFICE.

ELIAS E. RIES, OF NEW YORK, N. Y.

APPARATUS FOR RECORDING AND REPRODUCING SPEECH, &c.

SPECIFICATION forming part of Letters Patent No. 773,985, dated November 1, 1904.

Application filed February 26, 1903. Serial No. 145,267. (No model.)

To all whom it may concern:

Be it known that I, ELIAS E. RIES, a citizen of the United States, and a resident of the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Recording and Reproducing Speech, &c., of which the following is a specification.

My invention embraces certain new and useful improvements in apparatus for recording and reproducing speech and other sounds or impulses electromagnetically, by which various new and useful results, as well as economies in operation, are produced and by means of which the apparatus is better adapted to commercial requirements than has heretofore been possible.

My present invention relates more particularly to magnetic phonographs, telegraphones, or telephonographs of that class in which a magnetizable steel wire or ribbon that is wound from one spool or drum onto another is employed as a carrier or base for the magnetic record. When such records are in the form of an endless band or belt, their capacity for receiving vocal or other records is greatly limited, although their capacity for reproducing or repeating their contained records is practically unrestricted, owing to the endless nature and uniform direction of motion of the band. Such capacity for repetition of a record either after its original impression or subsequently thereto is in many cases highly desirable and for certain commercial purposes indispensable. Yet in view of the high speed of the wire or ribbon necessary in phonographs of this type such band or belt records are impracticable for most commercial purposes in which voice-records are employed. On the other hand, when a long record-wire is wound upon a spool or drum capable of containing, comparatively speaking, an unlimited length and is from thence wound upon a receiving spool or drum either in the process of receiving or of reproducing its record several new and serious difficulties arise that for many purposes make also this method commercially impracticable. Among these difficulties I may mention the following:

First. If such "long" containing-wire be

unwound from its original containing-spool for the purpose of receiving or being charged with a vocal, musical, or other record and then wound upon the receiving-spool, it cannot be immediately utilized to reproduce the record thus impressed upon it, but must first be unwound from the receiving-spool back onto the containing-spool and must then again be started on its forward journey until it has again been fully or to the desired extent wound upon the receiving-spool, which operation, it will be evident, consumes considerable time.

Second. If during such return operation the reproducing-electromagnet or one or more reproducing-telephones are allowed to remain in circuit, the impressed record will be reproduced in a backward or reversed direction, which is highly objectionable and irritating, particularly where a number of telephone subscribers, for example, are served from a central transmitting-telegraphone. If the reproducing-magnet or transmitter be cut out of circuit during the rewinding of the wire, the blank interval resulting may be mistaken by distant auditors as a cessation or as a non-operative condition of the service.

Third. In the case of coin-operated or "nickel-in-the-slot" apparatus, in which permanent records only are employed the inability of providing a continuous and uninterrupted succession of reproductions (for which, owing to its purity of expression, my magnetic phonograph or "telegraphone" principle is peculiarly well adapted) militates seriously against its adoption. In view of the high initial speed of the record-wire and its feeding mechanism a very much higher return speed or reverse feed for the purpose of cutting down the time consumed in resetting the instrument is inadvisable, because of the increased wear and tear on the feeding mechanism and the danger of breaking the record-wire, which latter for selections of considerable length must be made quite thin.

Fourth. For phonograph-records containing instrumental selections consisting of alternate parts (such as a main theme and refrain or chorus) that requires several repetitions in order to render the production complete—as, for example, records containing

dance-music whose proper rendition might consume a considerable period of time—a very long, cumbersome, and expensive record-wire and containing-spool would be required, whereas by means of the apparatus forming the subject-matter of my present invention, as will shortly be apparent, only a fractional part of the total length of the record-wire will be requisite.

Fifth. In instances where very long wires are used, particularly on phonograph instruments designed principally for use with shorter records, such long wires are objectionable owing to the distortion of the record when wound and unwound on spools the operative diameter of which is continually changing in an inverse direction with respect to each other, to overcome which would require special differential gearing or other compensating devices of greater or less complexity.

Sixth. Under the existing long wire or reel method of operation, more especially in telephonograph work, if it is desired to impress only part of the carrier-wire with a record or message such part must first be retraced or rewound before it can be read to its original starting-point, which must generally be ascertained by experiment or conjecture. If the length of blank wire remaining on a partially-charged reel is too short to receive an additional message, the entire charged portion will have to be wound back and the older or obsolete records at the commencement of the coil be expunged before additional matter can be received.

Seventh. While part of the length of the telephonograph-record wire is in use, the greater bulk of it (that wound upon the spools or reels) is inaccessible. A single message of only ephemeral value or perhaps of no interest whatever to the recipient cannot very well be omitted or wiped out from the tape as it is being received, but must take its place or its equivalent in space among the more valuable or permanent despatches or records. While one message is being "reproduced" or "retransmitted" from the wire another cannot be simultaneously "recorded" and "stored" therein, should this be desirable, since only a small portion of the total length of the coil is exposed.

In short, the existing types of telephonographs or telegraphones of the class at present under consideration while possessing many features of scientific interest in their development up to the present time are yet lacking in certain important features, more especially in connection with their use as magnetic phonographs that are thought to be more or less essential to their successful commercial exploitation and which it is the object of my present invention to supply.

By means of my invention I am enabled to retain all the practical advantages of the endless band or belt variety of telegraphone in

so far as immediate and unrestricted repetition and accessibility of the record or any desired portion of the same is concerned, while at the same time securing all the benefits of the long wire or spool system. In fact, I am enabled in addition to the foregoing to obtain certain other valuable advantages and economies which have not heretofore been possible of attainment with either the belt or coil type of apparatus.

This invention not only permits me to overcome the various difficulties, among others, hereinbefore specifically enumerated, in a simple, ingenious, and inexpensive manner, but it is believed will elevate the instrument from its present restricted field to a practically unlimited range of usefulness. These various advantages I obtain according to one form of my apparatus by the simple expedient of employing two oppositely running coils of wires or ribbons designed to serve as the carrier or base for the record or records, each of said wires or ribbons being separately mounted upon its own containing and receiving drums, spools, or reels in such a manner that one wire of the pair is being wound up on its receiving-drum while the other wire is being unwound from its containing-drum, the two sets of drums being simultaneously actuated or driven by a motor of any suitable form that is preferably common to both and to which the drums may be geared or otherwise connected. A reversing switch or gear is provided for changing the relative directions of motion of each set of drums when the wire on one set has been unwound, and vice versa, this being preferably accomplished automatically, means being provided, however, to permit of changing or reversing the direction of motion of the two sets of spools or drums manually whenever desired or for reversing the direction of motion of the record wires or ribbons at any intermediate portion of their travel, so as to permit of the recording, reproduction, or elimination of any intermediate portion of the record or records at will, as hereinafter more fully set forth.

In another form of my apparatus, which I have designed more especially for use as a magnetic phonograph—that is to say, an instrument designed chiefly for the reproduction of portable or interchangeable records previously impressed upon a wire and carried upon a suitable containing spool or drum—I make use of a simplified arrangement. It will be clear from a further consideration of the underlying principle of my present invention that its objects may be carried out equally well whether the two wires themselves run in opposite directions or whether the two wires run in the same direction, but have their respective records oppositely impressed thereon. It follows from this that instead of using two separate containing-spools I can place my entire record-wire on a

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single spool, thus greatly simplifying the construction, which is particularly advantageous in the case of phonographic instruments of the type referred to that are designed for use with portable or interchangeable records. In other words, I simply take a record-wire of any desired length, which may previously be impressed or charged with a magnetic record or series of such records, bend this wire at or near its center, fasten the bent portion to a containing spool or drum having preferably a slotted central dividing-diaphragm, place the spool on a revolving shaft, and simultaneously wind both halves of the record-wire upon the spool, one at each side of its central diaphragm, respectively. This containing-spool may then be placed in my improved magnetic-phonograph apparatus, the two loose ends of the wire being clamped or otherwise attached to the two halves of a similar receiving-spool, and the instrument is then ready for operation. To insure uniform feeding, the apparatus is provided with guides for evenly laying on the record-wire as it is wound upon the two halves of the spools.

The features above set forth, together with various other modifications and details of my invention, will now be more particularly described and will be readily understood by reference to the drawings, in which—

Figure 1 is a plan view, partly in section, of my improved telephonograph or telegraphophone apparatus provided with a double set of spools, the wire-feeding mechanism and the recording, reproducing, and eliminating electromagnets being omitted for clearness of illustration. Figs. 2 and 3 illustrate diagrammatically the direction of travel of the two wires and their respective spools when the type of driving-gear shown in Fig. 1 is employed, the lower wire shown in Fig. 3 being in practice maintained horizontally parallel with that of Fig. 2 by means of suitable guides (not shown in the diagram) over which it is passed. Fig. 4 is a diagram showing the method of impressing a record or records upon a long wire designed for use with a single containing-spool. Fig. 5 is a diagram, and Fig. 6 a plan view, showing the impressed wire of Fig. 4 attached at its center to a containing-spool, with its loose ends wound upon a receiving-spool, said spools being of the subdivided form, such as preferably employed by me in using my invention for phonograph work. Figs. 7 and 8 are detailed views, partly in diagram, of two types of reproducing-magnets adapted for operation with my duplex-wire phonograph instrument. Fig. 9 is a detailed diagrammatic view showing one of the two sets of recording, reproducing, and eliminating electromagnets and guiding-rolls employed by me when my invention is used as a telephonograph or telegraphophone instrument as in Fig. 1. Figs. 10, 11, and 12 are respectively an end elevation, a top or plan view, and

a side elevation of one form of my improved duplex-wire magnetic phonograph, parts of casing in each view being removed for clearness of illustration.

Like characters of reference indicate similar or corresponding parts in all the views.

Referring now to Fig. 1, A and B are the containing spools or drums carrying the magnetizable record-wires *a* and *b*, respectively, while A' and B' are the receiving spools or drums upon which these wires are wound when the instrument is in operation. It is to be understood that the terms "containing" and "receiving" as here used, especially when my instrument is used both as a recording and reproducing apparatus or telephonographophone, as in Fig. 1, are relative terms only, since these spools are alternately both containing and receiving spools. By the term "containing-spool" as herein employed is therefore meant the spool, reel, or drum that originally contains the wire which is to receive a magnetic record when the instrument is used for the reception of distant messages in the capacity of a recording apparatus or telephonograph or that which originally carries the charged wire containing a magnetic record that is to be locally reproduced when the instrument is used merely as a reproducing apparatus or magnetographophone. By "receiving-spool" is meant the spool, reel, or drum upon which the wire or other record-carrier is temporarily wound when the apparatus is in operation and from which it is ultimately wound back upon the containing-spool.

In Fig. 1 the spools A and B' are mounted so as to revolve loosely upon a common supporting-shaft *c*, while spools A' and B are similarly mounted upon a shaft *d* parallel therewith and at a short distance therefrom. These shafts are clamped or otherwise supported at their center upon uprights or brackets *c'' c'''*, forming part of a base plate or frame E'. Pivotaly mounted upon the frame E' by means of upper and lower trunnions, the upper one of which, *e*, extends through and has its bearing in a central bridging-piece (not shown) extending across the frame, is a driving-motor F of any suitable type—as, for example, an electric motor of light construction. The armature-shaft of this motor is provided with beveled friction wheels or pinions *f f'*, that are capable of being brought into operative relation with similar friction wheels or gears *f'' f''' f'''' f'''''*, to which the inner heads of the several spools may either be permanently fixed or are preferably removably attached by means of bayonet-slots engaging with the heads of studs *f'''' f'''''*, as shown in connection with the spool A'. Suitable means, such as grooves or collars on the shafts *c* and *d*, are employed to retain the beveled wheels in fixed position upon their respective shafts.

The beveled pinions f, f' in the position of the motor, as illustrated, have been brought into contact or engagement with the beveled wheels or gears to which the receiving-spools A' and B' are secured. These spools are now revolved by the motor, (whose direction of motion is preferably constant,) so as to cause the wires a and b to be wound thereon in the direction of the arrows from the containing-spools A and B. These latter being now free from contact with the pinions f, f' are at liberty to unwind, the arrangement of the parts being such that there is just sufficient friction between the containing-spools and shaft to keep the wire reasonably taut while it is being unwound. When the two wires have been fully or to any desired extent wound upon the receiving-spools, the motor is turned about its pivoted axis, so that its pinions come into contact with containing-spools A and B, which we will assume are now empty, and the wires will thus again be wound upon the containing-spools, the receiving-spools being now the trailing instead of the driven spools.

Fastened to the upright lugs e'' of the frame E' and extending across or bridging the same at a point below the line of travel of the wires a and b is a removable supporting-plate upon which are mounted two sets of the guide-rolls and two sets of the electromagnets that are shown diagrammatically in Fig. 9. The two sets of rolls and electromagnets are mounted upon a sliding base capable of a transverse motion along the bridging-plate, each set being directly over its respective wire a or b . Inasmuch as one form of sliding base containing guides and electromagnets is shown in and will be described with respect to the apparatus represented in Figs. 10, 11, and 12, it has not been deemed necessary to illustrate this feature as employed in connection with the type of apparatus represented in Figs. 1 and 9, as the construction and operation of the same will be readily understood. In fact, no special transverse feeding mechanism for the sliding base other than that furnished by the wire-guiding rolls will be necessary, since the natural coiling of the successive turns and layers of wire on the two receiving-spools will ordinarily insure a uniform to-and-fro feed and produce an evenly-distributed deposit of the wires in regular layers upon the spools.

From an inspection of Fig. 9 it will be seen that the wire a , moving in the direction of the arrow, passes in succession under three separate electromagnets, I being the impressing, R the reproducing, and E the eliminating magnet. One, two, or all three of these magnets may under certain conditions be in use at one time, as hereinafter explained, although in describing the operation of the instrument it will be well for the present to consider them singly. It should be further-
more understood that, as a rule, when either

one or more of the magnets over one wire—say a —are active the magnets over the opposite wire b are cut out of circuit or rendered inactive. This operation of cutting in and out of the opposite sets of electromagnets is preferably accomplished automatically by means of suitable switch-contacts, such as shown in Fig. 8, whenever the direction of motion of the spools is changed, as by the action of turning the driving-motor F upon its pivoted support when the end of a record or that portion of the record contained upon the wire of one spool is reached. Means may be and preferably are provided, however, for manually including one or more of the cut-out magnets in circuit whenever this is desirable. In specific applications of my invention where such manual switching in of the temporarily-idle magnets is unnecessary or undesirable the two opposite magnets or sets of magnets may be mounted upon a rocking lever, as shown in Fig. 7. This lever may likewise be operated either automatically or by hand, so as to alternately bring one or the other magnet or set of magnets into operative relation to their respective wires.

The operation of my improved telephonograph instrument as far as described will now be understood. Assume that the spools A and B are each loaded with a blank wire upon which it is desired to impress a record consisting, say, of a series of messages arriving over a telephone from some distant transmitting station or stations. The impressing or recording electromagnet I over the wire a is included in the local telephone receiving-circuit in the usual manner and the instrument being started in motion proceeds to impress a magnetic record of the message or messages upon the moving wire as it is being wound upon the receiving-spool A', this process continuing until the whole of the wire originally upon spool A has been transferred to spool A'. In the meantime the blank wire b has been transferred from its original spool B to the spool B'. When this double transfer has taken place, the motor F, with its friction wheels or pinions f, f' , changes its position, (by means of one of several agencies that I may employ for this purpose, as hereinafter described,) so that said friction wheels or pinions f, f' disengage themselves from the wheels or gears f', f'' of spools A' and B' and are brought into engagement with the opposite wheels or gears f, f' of the emptied spools A and B', which now become receiving-spools in their turn and draw the wires a and b upon them from the spools A' and B', respectively, said wires now traveling in an opposite or reverse direction from that indicated by the arrows. The change in position of the motor F has at the same time caused the magnet I over the wire a to be cut out from and the corresponding magnet I over the wire b to be cut into the telephone receiving-circuit, so

that now the wire *b* is being impressed with the transmitted messages, while the wire *a* is being idly wound back upon its original containing-spool A. This process continues until wire *b*, which may thus be regarded as a continuation of wire *a*, has been fully impressed, whereupon the parts will again have assumed their original position, with the difference that the wires upon both spools are now charged. If it be now desired to reproduce the record thus impressed upon the wires, the reproducing-electromagnet R, located over the wire *a*, is cut into circuit with a suitable local telephone or is included in a telephonic transmission-circuit if the record is to be transmitted to one or more distant points or stations in the usual manner or in one of several ways heretofore invented by me, which need not here be described, since these form no part of my present invention. The circuit of the reproducing-magnet R of wire *a* having been closed, the motor F is started, and the wire *a* is thereby wound upon spool A', traveling once more in the direction of the arrow. The record previously impressed upon the wire is now rendered audible by the telephone or telephones that are included in circuit with the reproducing-magnet, and the messages impressed on the wire are thus successively reproduced in proper order precisely the same as they were originally recorded. When wire *a* has been fully wound on spool A', the motor F is again shifted, as before, causing wire *b*, which has in the meantime been again wound upon its receiving-spool, to move from spool B' to spool B and to thus reproduce its half of the record by means of the reproducing-magnet R over the wire *b*, which has succeeded or taken the place of the first-mentioned reproducing-magnet in the telephone-circuit. Now it will be evident that by the time the last half of the total record, that on wire *b*, has been fully reproduced the first half of the record, that on wire *a*, will have been returned to its starting position or, in other words, will have reset itself. The instrument is therefore once more in a position to immediately and without a moment's delay go through the operation of repeating its record and if left to itself would continue to do so indefinitely. It will be clear, therefore, that in the operation of my improved telephonograph, as hereinbefore stated, no time is lost in rewinding or resetting the instrument, that it is always ready to receive or reproduce a message or messages, and that record-wires of any desired length may be used thereon without the disadvantages inherent in all previous apparatus of this type hitherto employed.

If it be desired to use the instrument for simultaneous recording and reproducing, the circuits of the magnets I and R at one side of the instrument are both closed, so that the magnetic waves or charges impressed by I are

immediately reproduced by R, either locally or at a distant point, as desired. If only one reproduction of the messages or other record is required, the circuit of magnet E is also closed, so that the record is eliminated or expunged from the wire immediately after its reproduction, as has been the practice heretofore, leaving the wire free to receive other records. It is frequently desirable, however, to wipe out a portion of the contained record without interfering with another or later portion and to do this, if possible, without subjecting either the operator or auditors to the time-consuming practice and incidental delays and other objections arising from the necessity of retracing or rewinding the wire or of leaving blanks therein as a result of such elimination that cannot be immediately or satisfactorily filled. By my invention I am enabled to readily accomplish this result, since by means of my duplex-wire instruments I am given immediate access for this purpose to practically one-half of the total length of the record-wire instead of to only a few inches of exposed wire, as was the case prior to my invention. I am furthermore enabled by my invention to simultaneously impress a message on one wire while the other is reproducing a different message previously impressed thereon and to accomplish other novel results of greater or less importance. In other words, suppose it is desired to eliminate the record or part of the record contained on wire *a* of Fig. 1 while wire *b* is reproducing or rendering its record. All that is necessary is to manually close the circuit of the eliminating-magnet on that side (*a*) for the necessary space of time and at the point where the desired erasure is to be made. If the entire record on wire *a* is to be expunged, such as might be the case if the wire were required for the reception of new impressions, the old record can be eliminated and the wire simultaneously charged with such new impressions without reversing or stopping the instrument or in any way interfering with the rendition of the record on wire *b*. By reference to Fig. 9 it will be seen that the order of arrangement of the magnets I R E with respect to the normal direction of travel of the respective wires is such that as the wire *a*, for example, travels forward in the direction of the arrow any given point thereon first-passes under the impressing, then under the reproducing, and finally under the eliminating magnets. When the wire travels backward, however, it approaches the eliminating-magnet before the impressing-magnet, so that the results just recited become practicable—that is to say, the old record is expunged from and a new one impressed on one wire while the other is reproducing or repeating its record. Although such new or filled-in record is impressed under the conditions just named in a direction opposite from the normal, this makes no material difference

in the operation of the instrument, provided the record on the second wire is also expunged after its reproduction in order that the direction of the new record to be impressed on both wires as a whole will be uniform when subsequently reproduced by the instrument. Should it be desired to frequently use the instrument in this manner, a supplemental reproducing-magnet *R'* may be placed in front of the impressing-magnet *I* at both sides of the instrument, so as to permit of simultaneous recording and reproduction when the normal direction of travel of the wires is reversed, as just described.

When the driving arrangement shown in Fig. 1 is employed by me, the position of the wires *a* and *b* with relation to their respective spools is as illustrated in the diagrams in Figs. 2 and 3—that is to say, wire *a* travels to and fro along the upper and wire *b* along the lower portion of their respective spools. As already stated, both wires are passed over guiding-rolls *g g g g*, (see Fig. 9,) which raise them to the same level and maintain them at a fixed distance from and parallel with each other. I am, however, by no means restricted to this method of driving nor to the diagonal disposition of the containing and receiving spools on opposite shafts, as shown, nor am I limited to the use of only two pairs or sets of such spools. I may be permitted, therefore, before proceeding to a description of the remaining figures to dwell a little further upon these features of my present invention and to explain the arrangement and advantages of the same in the light of what has already been said when applied to that class of apparatus which I have termed “telephonographs” or “telephonographophones.”

Under ordinary circumstances when my instruments are used for the reception, recording, and reproduction of signals, messages, or other intelligence from a distance—that is to say, when employed as a telephonographophone—it is not necessary that the spools or the wire contained on the same should be removable, since such records are usually of a transient character and are expunged or obliterated after a certain interval to make room for later messages. In such cases, however, it is desirable to provide a sufficiently long wire to contain the messages, stock-quotations, or other information that may be received, say, during a business-day of six hours, and, furthermore, to permit of ready access to or permit of the occasional reproduction of the messages or quotations that may have been received during any specified time or hour. It will be apparent that for obvious reasons this cannot be accomplished with the ordinary type of long-wire telegraphones heretofore employed. To accomplish this result in accordance with the principles of my invention hereinbefore set forth, I make use of an apparatus substantially similar to that shown in

Fig. 1, except that the containing-spools are mounted on one shaft and the receiving-spools on the other. Moreover, I employ any desired number of pairs or sets of such spools, all the containing-spools being on one shaft and all the receiving-spools on the other. A suitable driving-motor is provided, the transmitting-gear of which is so arranged as to drive first one and then the other shaft, so that the direction of travel of the several wires (which in this arrangement have the advantage of all running parallel and in the same plane with one another) is alternately reversed, as already described.

The several sets of spools when more than one set is employed may all be permanently secured to their respective shafts, so as to simultaneously revolve therewith, or, if desired, they may be loosely mounted thereon in pairs, so that each pair is capable of being brought into action successively by means of a suitable shifting device operated by the reversing-gear in any well-known or desirable manner. The objects in view are, however, attained in a more simple and in some respects a more desirable manner by means of an instrument of the former type, in which the series of spools are rigidly secured to their respective shafts and revolve simultaneously, and I will therefore limit the further description of the apparatus to an instrument of this type.

Let us assume that the instrument is provided with two shafts, such as *c* and *d* in Fig. 1, of sufficient length to contain six (6) sets of spools, the four spools shown in Fig. 1 being considered one set. Shaft *c* will then carry twelve (12) “containing-spools” and shaft *d* twelve (12) “receiving-spools.” The two driving-gears may be located either at the center or at one end of their respective shafts, which latter are journaled at or near their ends in suitable bearings. The twelve wires are carried over suitable guiding rolls or grooves formed in the transverse sliding frame already described, which is mounted on a fixed frame extending below the wires across the entire width of the instrument. The electromagnets employed by me with an instrument of this description vary somewhat according to the particular uses to which it is to be put. Preferably, however, I provide a principal set of electromagnets comprising two rows, such as shown in Fig. 9, each row consisting of an impressing, reproducing, and eliminating magnet, the order of arrangement of the *a* and *b* rows being reversed. In addition to these I provide an auxiliary set of twelve (12) reproducing-magnets, one for each wire. The principal and auxiliary magnets are independently mounted upon the sliding guide-frame, so as to partake of its to-and-fro feeding motion, and thus maintain their position of alinement over their respective wires. The auxiliary magnets in other

respects are stationary: but the twin row or set of principal magnets, which are together mounted upon a supplemental sliding support, are capable of traversing the entire width of the carriage and are so arranged as to be automatically moved across the same by a step-by-step motion in such a manner as to be brought in succession over each pair of the six sets of wires as the same are successively impressed. The length of wire on each of the twelve containing-spools is substantially the same, the total length of wire on the machine being thus divided into twelve equal parts. In order to permit of slight differences in length of the various wires, due to unequal expansion or other cause, as well as to relieve the wires of undue strain and possible danger of breaking when the instrument is started in motion or reversed in direction, I pass each wire in the form of a loop over a suitable compensating pulley or pulleys, as indicated at $g' g'$ in Fig. 9, these pulleys being adapted to yield to slight inequalities in tension of the wires and to take up any slack at the time of the commencement of the winding and rewinding operations. It may be here stated, however, that in this type of my apparatus it is not necessary that the spools shall be entirely unwound, as it is perfectly feasible, as will hereinafter appear, to leave a few turns or any desired number of layers of wire on each spool without interfering with the proper reversals of the instrument. The operation of this enlarged type of my improved telephonograph or telephonographophone will now be readily apparent from what has been previously said with reference to the single-unit or duplex type represented in part by Fig. 1 and need not, therefore, be described at length. It will suffice to say that when the instrument is started and continued in operation the primary impressing-magnet on the first or a wire will record its messages or message thereon, the corresponding magnet on the second or b wire being idle. As the first wire is being wrapped upon its receiving-spool during the process of receiving its charge all the other wires are being similarly (and for the time being idly) wound upon their respective receiving-spools. During the reverse travel or rewinding of the first wire its record is continued on the second wire by the secondary impressing-magnet of the principal set, the primary impressing-magnet being then cut out. The first wire, as well as the second and all the remaining wires, are at the end of this operation restored to their containing-spools. The next reversal of direction causes the carriage that supports the principal magnets to be shifted one double step, so that the primary magnet (active) is over the third wire and the secondary magnet (inactive) over the fourth wire of the series, and this recording process is repeated until the whole of the twelve wires have been charged, whereupon the carriage is shifted back to its position over the first pair of wires, and if further messages are to be received the recording process is repeated, this time with the eliminating-magnets energized, so as to expunge the first record by clearing the wire directly in front of the impressing-magnets. In the meantime, while the machine has thus been acting as a receiver and recorder of transmitted intelligence—as, for example, stock or market quotations in the shape of magnetic waves or charges impressed upon the wire or wires—this intelligence may not only be immediately translated upon its receipt into audible form by means of the reproducing-magnets of the principal set for the information or benefit of customers and others who are present at the time, but the whole of the previously-recorded intelligence or any desired portion or section thereof can be at once referred to and is independently accessible for immediate reproduction for purposes of comparison or for the benefit of late comers who may have missed the original announcement. In other words, notwithstanding the great total length of the record-wire or “magnetic tape” that is needed for this kind of service and which by my invention as exemplified in the particular type of my apparatus now under consideration, the information recorded thereon is at all times accessible for purposes of reference, comparison, or repetition at any one or more of twelve separate and substantially equidistant points or subdivisions, each of which is readily distinguishable from the other, not only in point of time or precedence, but also for certain classes of work in the nature or character of the recorded information, and accordingly permits of prompt and ready reference to such information in a manner and with a facility analogous to or even exceeding that afforded in consulting the various subdivisions, chapters, or pages of a printed book. It thus becomes possible, for instance, without stopping or in any wise interfering with the regular operation of the instrument in its work of recording and reproducing new or additional matter, to cause it to simultaneously and independently repeat or reproduce any desired portion or several distinct portions of the previous record for the benefit of one or more individuals. All of this, it will be evident, can be easily accomplished by the simple expedient of closing the circuit of, and thereby cutting into circuit with, a telephone receiver or receivers any one or more of the twelve auxiliary reproducing-magnets, six of the wires of which are constantly running in the proper direction for reproducing their respective portions of the record.

When my apparatus is used for recording and reporting stock or market quotations, as above cited, the spools may be conveniently divided, so that each pair will hold sufficient

wire to contain the record of a separate hour or other convenient time unit of a regular business day, so that the transactions pertaining to any given portion of the session may with certainty be referred to within the limit of even a fractional part of such time unit by closing the circuit of the proper auxiliary or reproducing magnet at any time or time multiple when the series of spools as they revolve together are approximately in the position occupied by them when the desired transactions were originally recorded.

To illustrate: Let it be assumed that the daily session during which such market reports are received occupies a period of five hours, extending from ten a. m. to three p. m., and that an additional hour, from three to four p. m., is to be devoted to the recording of news of a miscellaneous character. The apparatus, we will assume, is therefore provided with six pairs or twelve containing-spools, each spool carrying a length of wire that, with the machine running at a uniform speed, will record the transactions received during a time unit of half an hour. It will be evident that while one division of the apparatus is recording quotations received by it from a distant transmitting-station at, say, 2.15 o'clock p. m. the other spools or subdivisions are in position to present for immediate available reproduction the transactions recorded at 10.15, 11.15, 12.15, and 1.15 o'clock, respectively, any one or all of which may be rendered audible by closing the circuit of the corresponding auxiliary reproducing-magnet. Similarly, if reference to a sale or series of sales recorded at 11.25 o'clock is desired it is only necessary for the customer at 2.25 o'clock to press the listening-key of the telephone-receiver that is in connection with the "11-o'clock division" of the apparatus in order to have the transaction repeated to him. With a little practice it is unnecessary to consult a clock for this purpose, since the amount of wire laid on or taken off the series of spools will visually indicate to an observer with a fair degree of accuracy the subdivision of the hour or other time unit represented at any given moment by the appearance of the several sets of spools, although I may employ a special indicating device for this purpose where greater accuracy is desirable.

Under existing methods of recording stock and market quotations and news items or similar intelligence the record is usually printed upon a continuous roll of paper tape, which generally becomes unwound into a tangled mass and must be carefully and laboriously passed through the fingers in order to ascertain the nature of the information contained thereon, and from the manner in which the tape has been fed out by the ticker references to transactions or information recorded earlier in the day are not only difficult to locate and find, but the act of looking for

them usually involves reading the transactions backwardly or in a reverse direction from the order in which they were received. Furthermore, the tape when once impressed cannot be again used for new matter and must be thrown away when the business for the day is over. It will be obvious from what has been said that by means of the apparatus just described, which forms but one of a number of applications of my invention, these difficulties are overcome and avoided and that the same record-wires may be used repeatedly day after day, and therefore do away with the expense and trouble of feeding the recording apparatus with new record-carrying material, since the record impressed upon the wires is expunged either at the end of the day's business or concurrently with the beginning of business on the following day, as may be preferred, by the action of the eliminating magnet or magnets provided for this purpose. Moreover, this apparatus has the advantage of producing an intelligible audible record, thereby avoiding the strain upon the eyes that results from reading a printed slip the characters of which are oftentimes poorly impressed and are of necessity greatly abbreviated or in the form of arbitrary symbols that are intelligible only to an experienced observer and are decipherable even then with more or less difficulty.

By further subdivision of the record-wire in the manner described any desired increase in total capacity or any desired reduction in the length of wire in each reference-division may be easily obtained. It is not essential that the principal set or group of impressing, reproducing, and eliminating magnets shall be duplexed, as above described, since it will be evident that a single row of such magnets, such as shown in Fig. 9, if moved from one wire to the next by a single step-by-step action will accomplish the same purpose in view of the fact that in the type of apparatus now under consideration each wire is already provided with its individual auxiliary reproducing-magnet. It will, moreover, be understood that if the apparatus is to be employed for simultaneously recording telephonic or other intelligence transmitted to it from a number of separate circuits or sources of information the same may be readily accomplished by providing it with two or more impressing-electromagnets, the number of which that may be effectively used being limited only by the number of double sections (six in the present instance) into which the total length of wire is divided.

Referring now to Figs. 4, 5, and 6, a somewhat different method as well as arrangement of apparatus from that just described is disclosed. I have hereinbefore stated that from a consideration of the underlying principles of my invention it will be clear that its objects may be carried out equally well whether

the two wires themselves run in opposite directions or whether the two wires run in the same direction, but have their respective records oppositely impressed thereon. I further stated that accordingly I can place my entire record-wire on a single containing-spool, this not only simplifying the construction of the apparatus, but being particularly advantageous in the case of magnetic phonograph instruments that are designed to be used with portable or interchangeable records. The figures of the drawings now referred to will make this arrangement clear.

In the diagram Fig. 4, H is a reel or spool containing a blank steel wire *h*, which in the act of being unwound therefrom is drawn over the pole-piece or pole-pieces of an impressing-electromagnet *I'*, that is included in circuit with any suitable telephone-transmitter which is set into vibration by speech, vocal sounds, musical selections, or any other desired succession of sound-waves or other impulses that are to be permanently recorded upon the wire *h*. The successive portions of the record thus impressed or the sound-waves or magnetic charges constituting the same are for clearness designated on the wire by the numerals "1, 2, 3, 4, 5, 6, 7, 8, 9." When the proper length of wire for any complete record has been impressed, it is cut off from the reel H and bent or doubled upon itself at its center, as at the point marked "5." As will be seen from Figs. 5 and 6, this bent portion of the wire *h* is then secured to a containing-spool C, that is provided with a radially-slotted centrally-disposed diaphragm *c''*, that serves to partition the spool off into two equal portions, upon which the two lengths of the wire are respectively wound in the same direction. From this containing-spool the two ends of the wire are together led through or over the proper guide rolls or grooves onto the two halves of the receiving-spool D, provided with a similar separating-diaphragm *d''*. The receiving-spool D is in practice preferably provided with suitable clamps or receiving-studs adapted to promptly engage the loose ends of the wire *h*, or these loose ends may be joined and slipped over the slotted diaphragm *d''* prior to being wound upon the receiving-spool. To secure evenness in the layers and in feeding the wire, the hubs of the two spools are provided with a shallow groove extending along one-half of each spool from its intersection with the radial slot in the diaphragms *c'' d''* to the inner surfaces of the upper or outer heads *c' d'* of the containing and receiving spools C D, respectively, the construction of the slotted and outer heads being such as to direct and hold the looped portion of the wire in proper place, and thereby secure a perfectly clear feeding-space for the wire the moment the looped end or ends thereof are slipped into position. I am thus enabled, particularly when the spools are to be used

for graphophonic or reproduction work exclusively, to secure a greater degree of flexibility and simplicity in handling the apparatus, since only the containing-spool that carries the record need be made portable or interchangeable, the receiving-spool remaining permanently in the instrument.

Referring now once more to Fig. 5, it will be seen that the records on the two halves *h'* *h''* of wire *h* now run in opposite directions. Assuming that the two halves of the wire are being wound upon the two sections of the receiving-spool D and that they be bridged, respectively, by the reproducing-magnets *R' R''*, mounted upon the rock-shaft *r*, (shown in Fig. 7,) then magnet *R'* will be in operative proximity to branch wire *h'*, while magnet *R''* is out of contact or at a distance from branch wire *h''*, both magnets in this case being permanently connected in circuit with a telephone common to both. Under these circumstances wire *h'*, the magnetic record on which travels in a forward direction—that is, from "1" to "5"—will cause the audible reproduction of its record in the telephone, while wire *h''*, whose record is traveling backward—that is to say, from "9" to "5"—will be temporarily idle or inactive. When spool D is filled, the automatic reversing-switch, (one or two forms of which will be hereinafter described,) is brought into action, causing the reversal of the direction of motion of both spools C and D and at the same time moving the shifting-rod *r'* so as to bring magnet *R''* into and move magnet *R'* out of proximity to wires *h''* and *h'*, respectively. The record impressed on wire *h'* is now moving backward from "5" to "1," while that on *h''* is moving forward from "5" to "9," thus causing the latter to reproduce its portion of the record on the telephone in continuation of that on wire *h'* already rendered by it. It will therefore be apparent that by means of this simple arrangement the record or records contained on any desired length of wire can be continuously reproduced without break in the rendition and without any loss of time occasioned by the practice formerly necessary of rewinding or resetting the instrument.

Figs. 10, 11, and 12 illustrate one organized form of apparatus that I have devised for the purpose of carrying into effect the method of recording and reproducing just described with reference to Figs. 4, 5, and 6. Although I have shown this apparatus as a magnetic phonograph or magneto-graphophone, it will be understood that with a slight change in the number and arrangement of the electromagnets it can also be used as a phonographophone—that is to say, an apparatus for recording as well as reproducing local sound-waves, such as recitations, vocal and instrumental selections, &c. This apparatus consists of a casing or framework *L*, closed on the bottom, front, and ends, but preferably

open at the top and back, Fig. 12 being a front elevation with the front part of the casing removed to show the interior construction. The containing-spool C in this and in the top view, Fig. 11, is shown at the right and the receiving-spool D at the left. The shaft *c*, upon which the containing-spool is free to revolve, is rigidly secured to the front plate of the casing. The shaft *d*, on the other hand, which supports the receiving-spool, is secured to one arm of a movable bell-crank lever *k* in such a manner that the spool D is capable within certain limits of approaching and receding from the spool C when the machine is in operation. As shown in the drawings, spool D is represented at its farthest position to the left away from spool C. Pivoted to the front casing at its central lower portion is a reversing or controlling switch-lever N, having a triangular-shaped body portion that supports and carries a number of small driving-gears. In the position shown—that is to say, to the left of its central or neutral position, (indicated by the dotted line *x x*), in which position it bears against a limiting-stop *s*—this lever causes its driving-gears to impart motion to the receiving-spool D in the direction of the arrow in the manner about to be described, thereby causing the two branches of the impressed wire *h* to wind itself thereon from the record-containing spool C. Secured to the bottom of the casing L is a driving-motor M, Figs. 10 and 12, of any suitable type, such as a spring or electric motor, whose shaft is provided with a driving-pinion *m*, that is directly behind and in line with the pivot *n*, about which the lever N moves. This pinion meshes with an intermediate pinion O, which in turn imparts motion to the left-hand driving-pinion *o*, which latter turns the right-hand driving-pinion *o'* in a direction opposite to its own. In the position of the lever as illustrated the left-hand driving-pinion *o* meshes with a gear-wheel P, which has its bearing on a stud *p*, projecting inwardly from the front wall of the casing L, this stud *p* also serving as a pivot for the bell-crank lever K. The gear-wheel P engages a pinion *q*, which, together with a disk or clamping-plate Q, forms part of a sleeve S, that is journaled upon the inner end of the shaft *d*, that supports the receiving-spool and which, as already stated, is secured to the longer arm of the bell-crank lever K. The clamping-disk Q is provided with bayonet-slots *v v* or their equivalent, that are adapted to engage with studs in the head of the spool to lock it in position. It will thus be seen that if motion is imparted to the motor, so as to rotate the intermediate pinion O in the direction of the arrow, the receiving-spool will be revolved, as indicated, in such a direction as to draw the wire from the containing-spool. If while the motor is thus running the lever N be moved to the right of the line *x x* as far as the limiting-stop or pin *s'* will permit, the left-hand

driving-pinion *o* will leave gear P and the right-hand driving-pinion *o'* will engage with the gear P', which in turn will drive pinion *q'*, which latter by means of a sleeve S' and clamping-disk Q' and its bayonet-slots *v' v'* imparts motion to containing-spool C in a reverse direction, as shown by the dotted arrow, so that the wire *h h* will be rewound upon the containing-spool C C. The right-hand gear-wheel P' is likewise free to revolve upon a stud *p'*, that is secured to the front of the casing. In order to put a slight tension upon the wire or wires *h h* and prevent the same from unwinding itself from the spool whose driving-gear P or P' happens to be disengaged, I provide a spring friction-disk for each of said gears P P', such as shown at *p'''*, said friction-disk being clamped between a shoulder on the stud *p'* and the casing L, and which may have its periphery slotted or divided into two or more spring-fingers that bear with a slight frictional pressure upon one side of the gears P P'. As already stated, the friction thus imposed will, while not interfering with the free operation of the machine, serve to maintain a slight tension on the wire or wires *h h*, and thus hold them reasonably taut when one or both of the driving-pinions *o o'* are out of contact with their respective gears P P', such as would be the case when the lever N occupies the neutral position, (indicated by the dotted line *x x*.) To the controlling and reversing lever N is pivoted a link bar *k*, which is provided with a slot *k'*, within which a pin *k''* on the bell-crank lever K is free to move. A spiral spring *z*, secured at one end to the link bar *k*, tends to normally hold the lever N in the position shown—that is to say, into operative engagement with the left-hand spool D—while a similar spring *z'*, attached to the upper end of the bell-crank lever K, tends to draw said lever and its shaft *d*, that carries the receiving-spool D, into its leftward position, as shown—that is to say, away from the spool C. A pin or stop *z''*, that engages with a shoulder on a pendent gravity link or catch Z, whose upper end is loosely pivoted to the shorter arm of the bell-crank lever K, serves to limit the backward sweep of the bell-crank lever under the influence of the spring *z'*. The lower end of the lever N has a projecting cam *n'*, which when the lever occupies the position shown comes into contact with the face of the pendent catch Z and holds it back from its normally vertical or forward position, but when the lever is moved to the right allows the catch Z to swing forward into the position shown in dotted outline. The lever N also has at its lowest extremity a cam *n''*, provided with a tooth, as shown, which is adapted to be engaged and locked by a corresponding tooth on the upper face of a pawl W, that is pivoted at *w* and is normally pressed upward by a spring *w'* when the lever N is moved to the right. Secured to the bottom

of the casing L, midway between the spools C and D, are two inner upright frames or supports *l l*, (shown broken away in the end view, Fig. 10,) that are united at the top by a pair of transverse guide rods or ways *l' l'*, which, together with the frame, serve as a support for the wire-feeding mechanism and for the carriage containing the reproducing-magnets or translating apparatus. This feeding mechanism consists of a feed-screw Y, provided, preferably, with duplex or reverse threads that engage with suitable nuts (not shown) on the under side of the carriage Y', which nuts, respectively, are alternately thrown into and out of gear with one or the other of said threads when the carriage has reached one or the other end of its travel along the guide-rods *l l*. The feed-screw Y receives its motion through a pinion *y''''*, that meshes with a large intermediate gear *y'''*, which in turn is driven by either one of two pinions *y'* or *y''*, that derive their power from the gear-wheels P and P'. The pinions *y'*, *y''*, and *y''''*, as well as the pinions *q'* and *q''*, are, as illustrated, all of equal diameter or pitch. The result of this is that when the gear P, for example, is driven by the motor M, through the intervening gears *m*, O, and *o'*, the spool D and the feed-screw *y* will each complete one revolution in the same time. If, therefore, the pitch on the feed-screw thread or threads is made equal to the thickness of the wire *h h*, the turns of the wire will be evenly deposited upon the receiving-spool by the feeding mechanism both in a to and fro direction.

In applying my invention to magnetic phonographs in which permanent and interchangeable records are to be used, as in the type of apparatus under consideration, I find it desirable for several reasons to employ a somewhat heavier or thicker record-wire than in the case of telephonographic apparatus such as hereinbefore described. In other words, I have found that a thick wire if properly magnetized will hold its record for a much longer time than a thin wire and can likewise be more strongly impressed. At the same time a very slight increase in diameter of the wire adds materially to its strength, so that the records can be more readily transported and more roughly handled without injury. On the other hand, very thin wires are more desirable for that class of apparatus in which recording, reproducing, and eliminating magnets are used, as hereinbefore described, and in which the record, while perhaps of considerable length, is usually of a more or less transient character and in which, therefore, the spools containing the wire or wires are not ordinarily intended to be removed from the instrument. Consequently in the type of my reproducing apparatus illustrated in Figs. 10, 11, and 12 the wires *h h* are led directly from the containing

passed over friction-rolls and compensating pulleys, such as shown in Fig. 9, (although these may of course be employed,) and I furthermore make use of the increase of tension on the wire when it is fully unwound, as will presently appear, as a means for automatically operating the shifting or reversing mechanism.

The operation of the instrument may now be described and will be readily understood. Assume that the instrument is idle and that it is desired to insert and reproduce a phonographic record. A containing-spool C, carrying the desired record, is selected, slipped through the open back of the instrument, over the shaft *c*, and locked in position against the carrying-disk Q' by the bayonet-slots or other means provided for that purpose. The looped ends of the wire *h h* are carried over the grooved brass guides *h''' h''''*, that form part of the carriage Y', and under the reproducing-magnets R''' R''''', that are mounted upon the same, and are then placed in position on the receiving-spool D, as previously explained. The controlling-lever N is then moved toward the left against the limiting-stop *s*, as shown, (provided it does not already occupy this position,) and the motor M is started in operation. The power of the motor is now transmitted, through gears *m*, O, *o'*, P, and *q* and through the sleeve S and carrying-disk Q, to the receiving-spool D, which is thereby caused to revolve toward the left, as indicated by the arrow. At the same time the carriage-feed screw Y is caused to revolve by the meshing of the pinion *y'* with the gear P. The spool C being out of engagement with the now idly-revolving pinion *o'*, and therefore free to unwind except for the slight tension put upon it by the braking-disk *p''''*, the wires *h h* are drawn over the guides *h''' h''''* and under the magnets R''' R''''' and through the feeding action of the screw Y are gradually deposited in even layers upon the two halves of the spool D, as shown. While this is taking place the record carried by one half of the wire—that passing under the magnet R''''—is being reproduced, the opposite magnet R''' being open-circuited, as more clearly shown in the detail view Fig. 8. This operation of opening and closing or of alternately including and excluding the opposite magnets from the translating or reproducing circuit or circuits is preferably automatically accomplished by the action of the reversing-lever, as will hereinafter appear. Now when the wire has been unwound from the containing-spool C as far as it can go, the continued action of the motor M will cause a tension to be placed upon the wire *h h*, that still connects the two spools C and D. The effect of this tension is to immediately draw the spool D (which is mounted on the bell-crank lever K) toward the spool C. In doing this, the bell-crank lever K, swinging on the pivot *p* and

assisted in part by the momentum of the loaded spool D, pushes forward the link k against the tension of the spring z , thereby forcing the lever N, with its train of gears, against the right-hand stop s' , thus permitting the pawl W to at once engage with the tooth of the cam n'' , so as to prevent its return. This action has likewise served to disengage the gears o and y' from the gear P and to cause the engagement of gears o' and y'' with the gear P', which in turn immediately rotates the spool C in the direction of the dotted arrow and causes the rewinding of the wire h thereon. The extra tension on the wire having been relieved by the freeing of the gear P from its driving-pinion o , the bell-crank lever K and its spool D are gradually drawn back to normal position under the influence of spring z' , the slot k' in the link k permitting the pin k'' to return freely for this purpose. During this rewinding operation the reproducing-magnet R'''' is cut out and magnet R''' cut into the circuit, so that the second or remaining half of the record is now being reproduced. The lever N has an adjustable stop N', that may be manually set so as to come into engagement with the casing at its central point, as at s' , (as well as at other points,) and thus to cause the stopping of the instrument when the record has been completely rendered. If, however, it is desired to repeat a record one or more times, the stop N' is not set, thus permitting the movements of the reversing-lever N to be controlled by the instrument itself. This self-repeating operation is performed as follows: When the wire has been entirely rewound upon the spool C, there will once more be a tension upon it that will draw the spool D forward. When this occurs, the pendent link Z will descend in the position shown in dotted line, so that it will engage and carry with it the projecting nose of the pawl W, that lies in its path, thereby immediately releasing the lever N, which is at once drawn back by means of spring z into operative engagement with spool D, as before. The cam n' now again projects itself against the gravity-link Z and causes its further movement to be clear of pawl W.

It will be evident from what has been said that with this apparatus any given phonographic record or selection can be reproduced as often as desired without loss of time in rewinding or resetting and without the attention of the operator. One advantage resulting from this is that I am enabled for certain classes of work, such as the reproduction of vocal selections or dance-music having a number of similar parts, to employ comparatively short and inexpensive wires, by recording said parts but once, instead of the long record-wires that would otherwise be found necessary for a complete and uninterrupted rendition. Moreover, my records are far more compact and durable than and infinitely su-

perior in clearness and quality to, the ordinary phonograph-cylinders or gramophone-disks and permit of equal facility or accessibility for repeating intermediate portions of a given record that has already been partially rendered. For example, if the desired portion of the record happens to be equally distributed between, say, the last half of the first wire and the first half of the second wire then by manually throwing the reversing-switch at the completion of the first rendering of the desired section it will instantly proceed to repeat itself, after doing which the record will continue to its natural termination.

Another advantage of this instrument, especially when applied to coin-operated apparatus, to which it readily lends itself and for which purpose it likewise has a useful field, is that when the record has been rendered the instrument has been rewound and is thus immediately ready for a fresh start. Moreover, the records are not all limited to a given area or surface, or, in other words, restricted to a certain uniform time interval in delivery, which necessitates the undue abridgment of many selections. On the other hand, the instrument is capable of reproducing interchangeable records varying greatly in their respective lengths and limited only by the amount of wire on the containing-spool, while at the same time the feeding mechanism is so arranged as to bring the instrument to a stop upon the completion of the selection or selections whether the record-wire be a long or short one. Still another advantage of this construction is that the record-carrying spool is "self-contained," thus requiring but a single spool that is both portable and capable of prompt insertion and removal and which at the same time fully protects the record against mechanical injury in transportation and handling.

Referring to the diagram Fig. 8 it will be seen that the reproducing-magnets R''' and R'''' are alternately cut into the circuit containing the reproducing-telephone or other translating device, to which the wires u' and u'' are led by the movement of the switch-handle v'' . This switch may be mounted upon the carriage Y' within the area shown by the dotted rectangle, which carriage may also, if desired, carry the reproducing-telephone and sound-magnifier. In practice, however, I prefer to connect this switch-lever with the controlling-lever N in such a manner that the movements of the latter will automatically control the same, or, preferably, the controlling-lever N may itself constitute the switch-lever, as shown in Fig. 11, where the inside of the front casing L is provided with two insulated contacts, from which wires u' and u'' lead, one contact being at each side of the center line of the controlling-lever N. A projection or wiper u''' on the handle portion of the lever N makes connection with one or the

other of said contacts when at its extreme right or left position and is out of connection with said contacts when in its central position. One of the two terminals of magnets R''' and R'''' are joined together as in Fig. 8 and led to one terminal of the translating or reproducing device. The other terminals of R''' and R'''' are connected with u'' and u' , respectively, while the controlling-lever or its wiper u''' is in electrical connection with the other terminal of the translating device. By this arrangement neither the translating device nor the reproducing-magnets are active when the lever N is in its neutral position, while said translating device and its proper reproducing-magnets are active when the lever is at one or the other side of its neutral position.

Although in Figs. 10, 11, and 12 I have illustrated a type of reversing mechanism depending for the operation upon the increased tension placed upon the wire when the latter has reached the end of its travel, I am by no means limited to this method of reversing, as I may employ various other means for accomplishing this result without departing from the scope of my invention. In Fig. 6, for example, I have shown an arrangement in which I utilize the increase and diminution in the number of layers of wire on the receiving-spool for reversing the direction of travel of the wires or of the rotation of the spools or motor. Referring to this figure, it will be seen that a pivoted or resilient rod U supports at its free upper end an adjustable threaded screw u , having a rounded bearing-surface that is normally pressed against the wire on the receiving-spool D either by virtue of the resilience of the rod U or by the tension of a special spring that may be provided for this purpose, as shown. Two limiting-stops, which may be either fixed or movable, are adapted to make electrical contact with the rod U . These stops are respectively connected by wires u' and u'' with the right and left hand magnets of a suitable electrically-controlled reversing switch or device, (not shown,) the other terminals of said magnets being connected through a suitable battery with the rod U by wire u''' . The magnets that operate the reversing-switch also cut into and out of circuit the respective reproducing-magnets corresponding to the wires u' and u'' , or the rod U , with its contacts, may itself be so arranged as to perform this function directly through the wires u' , u'' , and u''' . It will be evident that when the arrangement of the device is as shown the reversing switch or device is automatically operated both when the receiving-spool D is full and when it is empty. By turning the screw u the device may be adjusted to suit records of different lengths and also to cause a reversal of motion at any desired portion or portions of a given record.

Although I have illustrated and described herein various types of instruments and ap-

paratus that I have devised for carrying out my improved method of recording and reproducing speech and other sounds or impulses magnetically or electromagnetically and have specifically pointed out how the same may be employed for various purposes, I desire it to be understood that I do not limit myself either to the particular types or to the precise construction of the apparatus or instruments herein set forth or to the manner of their use as herein described, since the same may, as will be evident, be widely varied or modified without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A magnetic phonograph or telephonograph apparatus having two sets of records designed and adapted to simultaneously move in opposite directions.

2. A magnetic phonograph or telephonograph apparatus having a record divided into two portions, one portion being designed and adapted to move in a direction opposite to that of the other.

3. A magnetic phonograph or telephonograph apparatus having a subdivided record whose subdivisions travel in opposite directions.

4. A magnetic phonograph or telephonograph apparatus having a substantially continuous record-wire divided into consecutive sections or lengths, parts of the wire of each section being permanently exposed so as to render the several sections independently accessible for operation or reference.

5. A magnetic phonograph or telephonograph apparatus having a record media in the form of multiple sections or divisions designed and adapted to receive portions of a record or a series of records, in combination with reproducing means arranged to be selectively brought into operative relation with any one or more of said multiple sections for the purpose of causing the reproduction of the record impressed thereon.

6. A phonograph or telephonograph apparatus having a subdivided record media whose subdivisions are designed and adapted to contain or receive records or parts of a record differing in character from one another, in combination with a separate reproducing device for each subdivision of the record media, and means for independently bringing any one or more of said reproducing devices into operative relation with their respective subdivisions of the said record media, whereby any one or more of the records or record parts contained by the several subdivisions may be reproduced at will independently of the others and without mutual interference while the apparatus is in operation.

7. A magnetic phonograph or telephonograph apparatus having a continuous record-

wire subdivided into two or more alternately-operative sections or lengths.

8. A magnetic phonograph or telephonograph apparatus having a continuously-moving record-wire subdivided into two or more alternately-operative sections or lengths.

9. A magnetic phonograph or telephonograph apparatus having two or more record-wires moving in opposite directions.

10. A magnetic phonograph or telephonograph apparatus having one or more pairs of record-wires, the wires of each pair moving in opposite directions with respect to each other.

11. A magnetic phonograph or telephonograph apparatus having a continuous record-wire subdivided into two or more alternate or successive sections, each section being alternately operative with respect to its preceding or succeeding section.

12. A magnetic phonograph or telephonograph apparatus having one or more pairs of moving record-wires, one wire of a pair being in a condition of operativeness while the other is in a condition of inoperativeness.

13. A magnetic phonograph or telephonograph apparatus having one or more pairs of moving record-wires designed and adapted to receive or to reproduce a record or series of records, or to simultaneously receive and reproduce a record or series of records, one wire of a pair being adapted to receive one or more records or part of a record while the other is reproducing the records or parts of a record contained by it.

14. A magnetic phonograph or telephonograph apparatus having a record-wire subdivided into sections or lengths, said apparatus being provided with an operating coil or magnet or set of operating coils or magnets for each subdivision of said wire, substantially as set forth.

15. A magnetic phonograph or telephonograph apparatus having two or more record-wires moving in opposite directions, said apparatus being provided with an operating coil or electromagnet or set of operating coils or electromagnets for each of said wires, substantially as and for the purpose or purposes set forth.

16. A magnetic phonograph or telephonograph apparatus having two sets of magnetic records or impressions designed and arranged to simultaneously move in opposite directions, said apparatus being provided with an operating helix or set of helices for each set of records or impressions, one or more of the helices of one set being thrown out of operation while one or more of the helices of the other set are in operation, substantially as and for the purpose or purposes set forth.

17. A magnetic phonograph or telephonograph apparatus having two sets of magnetic records or impressions designed and arranged to simultaneously move in opposite directions,

said apparatus being provided with a reproducing helix or electromagnet for each set of records or impressions and a translating device in circuit with such reproducing helices or electromagnets, said apparatus being also provided with means for throwing out of action one of said reproducing helices or magnets when the other helix or magnet is in operation, and vice versa, substantially as and for the purpose set forth.

18. A magnetic phonograph or telephonograph apparatus having a looped or subdivided record-wire containing two or more records or parts of a record running or extending in reversed directions with respect to each other, said apparatus being provided with a translating device or devices, substantially as described, designed and arranged to be alternately operated first by one and then by the other of such records or parts of a record, substantially as set forth.

19. A magnetic phonograph or telephonograph apparatus having one or more pairs of spools or reels upon which a record wire or wires are wound and unwound, respectively, and provided with means for changing or reversing the direction of motion of the spools or reels, substantially as and for the purpose or purposes set forth.

20. A magnetic phonograph or telephonograph apparatus having one or more pairs of spools or reels upon which a record wire or wires are wound, respectively, a driving-motor for imparting motion to said spools in one direction and a reversing device for automatically changing the direction of motion of said spools, substantially as and for the purpose or purposes set forth.

21. A magnetic phonograph or telephonograph apparatus provided with a containing and receiving spool designed and adapted to contain and receive, respectively, one or more record-wires, a driving-motor arranged to normally impart motion to the receiving-spool, and an automatic reversing device or gear for causing said motor to drive the containing-spool when the receiving-spool is filled, substantially as set forth.

22. A magnetic phonograph or telephonograph apparatus having containing and receiving spools for the record-wire, and means, substantially as described, for alternately driving the containing and receiving spools at approximately the same rate of speed.

23. A magnetic phonograph or telephonograph apparatus having a subdivided record-wire and one or more containing and receiving spools therefor, and means, substantially as described, for imparting an approximately uniform rate of motion to each subdivision of the record-wire.

24. A magnetic phonograph or telephonograph apparatus having a record wire or wires and one or more containing and receiving spools therefor, means for causing the wire

or wires to be wound from the containing spool or spools onto the receiving spool or spools and vice versa, and means, substantially as described, for feeding the wire or wires in even and uniform layers upon the spool or spools upon which it is being wound, substantially as set forth.

25. A magnetic phonograph or telephograph apparatus having a record wire or wires and one or more containing and receiving spools therefor, means for causing the wire or wires to be wound from the containing to the receiving spool or spools and vice versa, and means, substantially such as described, for compensating for variations in length and taking up the inertia of the wire or wires, substantially as and for the purpose set forth.

26. In a magnetic phonograph or telephograph apparatus of the class described, the combination, with a moving record-wire and its containing and receiving spools, of a yielding take-up device or devices for the wire designed and arranged to put it under a slight tension, substantially as and for the purposes set forth.

27. In a magnetic phonograph or telephograph apparatus of the class described, the combination, with the record wire or wires and its containing and receiving spools, of a laterally-movable guide-frame for the wire or wires, said frame containing also the operating helices or magnets, substantially as described.

28. In a magnetic phonograph or telephograph apparatus of the class described, the combination, with the record wire or wires and its containing and receiving spools, of a laterally-movable guide-frame for the wire or wires, said frame containing also the operating helices or magnets, and carrying a yielding take-up device or devices around which the record-wire is adapted to pass, substantially as described.

29. In a magnetic phonograph or telephograph apparatus of the class described, the combination, with the record wire or wires and its containing and receiving spools, of a laterally-movable guide-frame for the wire or wires, said frame containing also the operating helices or magnets, and a to-and-fro feeding mechanism or device for imparting motion to said guide-frame and cause it to deposit the record-wire upon the receiving spool or spools in even layers.

30. In a magnetic phonograph or telephograph apparatus of the class described, the combination, with the record wire or wires and its containing and receiving spools, and its driving mechanism, of means actuated by the deposit of the wire upon the receiving spool or spools to cause a reversal of the direction of travel of the wire or wires, substantially as set forth.

31. In a magnetic phonograph or telephograph apparatus of the class described, the

combination, with the record wire or wires and its containing and receiving spools, of a driving-motor revolving constantly in one direction and gearing or friction devices driven thereby and designed and adapted to impart motion to the spools alternately so as to cause the record wire or wires to travel first in one and then in the other direction, substantially as set forth.

32. In a magnetic phonograph or telephograph apparatus of the class described, the combination, with the record wire or wires and its containing and receiving spools, of a supporting shaft or shafts for said spools, driving mechanism for said shafts or for the spools supported thereon, arranged and adapted to cause the rotation of said spools first in one and then in the other direction, and means for rapidly and removably securing said spools or either of them to said shafts or to the driving mechanism thereof, substantially as set forth.

33. In a magnetic phonograph or telephograph apparatus of the class described, the combination with a suitable driving mechanism of two substantially parallel shafts carrying several pairs or groups of spools containing the record wire or wires of the apparatus, said wires being normally passive but arranged and adapted to be brought into active operation successively when the apparatus is set in motion, substantially as set forth.

34. In a magnetic phonograph or telephograph apparatus of the class described, the combination with a suitable driving mechanism, of two substantially parallel shafts, carrying several pairs or groups of spools containing the record wire or wires of the apparatus, an impressing or recording electromagnet or its equivalent common to all the wires and a separate reproducing-electromagnet or its equivalent for each separate wire or subdivision thereof, substantially as set forth.

35. In a magnetic phonograph or telephograph apparatus of the class described, the combination, with the supporting-shaft and driving mechanism, of a record-carrying spool having a centrally-disposed slotted diaphragm dividing it into two portions each adapted to receive one-half of the record-wire, substantially as set forth.

36. In a magnetic phonograph or telephograph apparatus, a portable record-carrying spool having two heads and a central separating-diaphragm dividing it into two portions each adapted to receive one-half of the record-wire, the said heads and diaphragm serving as protecting and confining guards for the record-wire, substantially as set forth.

37. In a magnetic phonograph or telephograph apparatus, a portable record and carrying-spool consisting of a subdivided spool carrying or containing the two halves (or other subdivisions,) of a record-wire whose central portion is secured to the body of the spool

and its two halves, commencing from said central portion, wound simultaneously upon either side or subdivision of the spool and having its terminals preferably joined in the form of a loop, substantially as set forth.

38. In a magnetic phonograph or telephonograph apparatus, a portable record consisting of a subdivided wire wound upon a suitable containing spool in two simultaneously-accessible sections, one section of the wire containing or adapted to receive a magnetic record or impression which, when the wires are unwound from the spool, runs in a reverse direction to that contained or received by the other section, substantially as and for the purpose set forth.

39. In a magnetic phonograph or telephonograph apparatus, the combination, with a driving mechanism having a substantially uniform rate of speed, of a series of spools arranged to be driven thereby and each containing a record-wire adapted to be impressed by magnetic waves or lines of force that are locally set up therein by the operation of a distant transmitter and representing a record translatable into audible sounds or signals comprising news items or other intelligence corresponding to that spoken into or otherwise impressed upon the said transmitter, the wires contained on the several spools of the series being arranged and adapted to be impressed in successive order and each within a predetermined period of time, substantially as and for the purpose described.

40. In a magnetic phonograph or telephonograph apparatus, the combination of a series

of spools or sets of spools each containing a record-wire, a recording-magnet common to the several wires and adapted to energize or impress each of the same in succession, a reproducing-magnet for each of the said record-wires, and a telephone receiver or receivers adapted to be cut into circuit with the several reproducing-magnets, substantially as and for the purpose described.

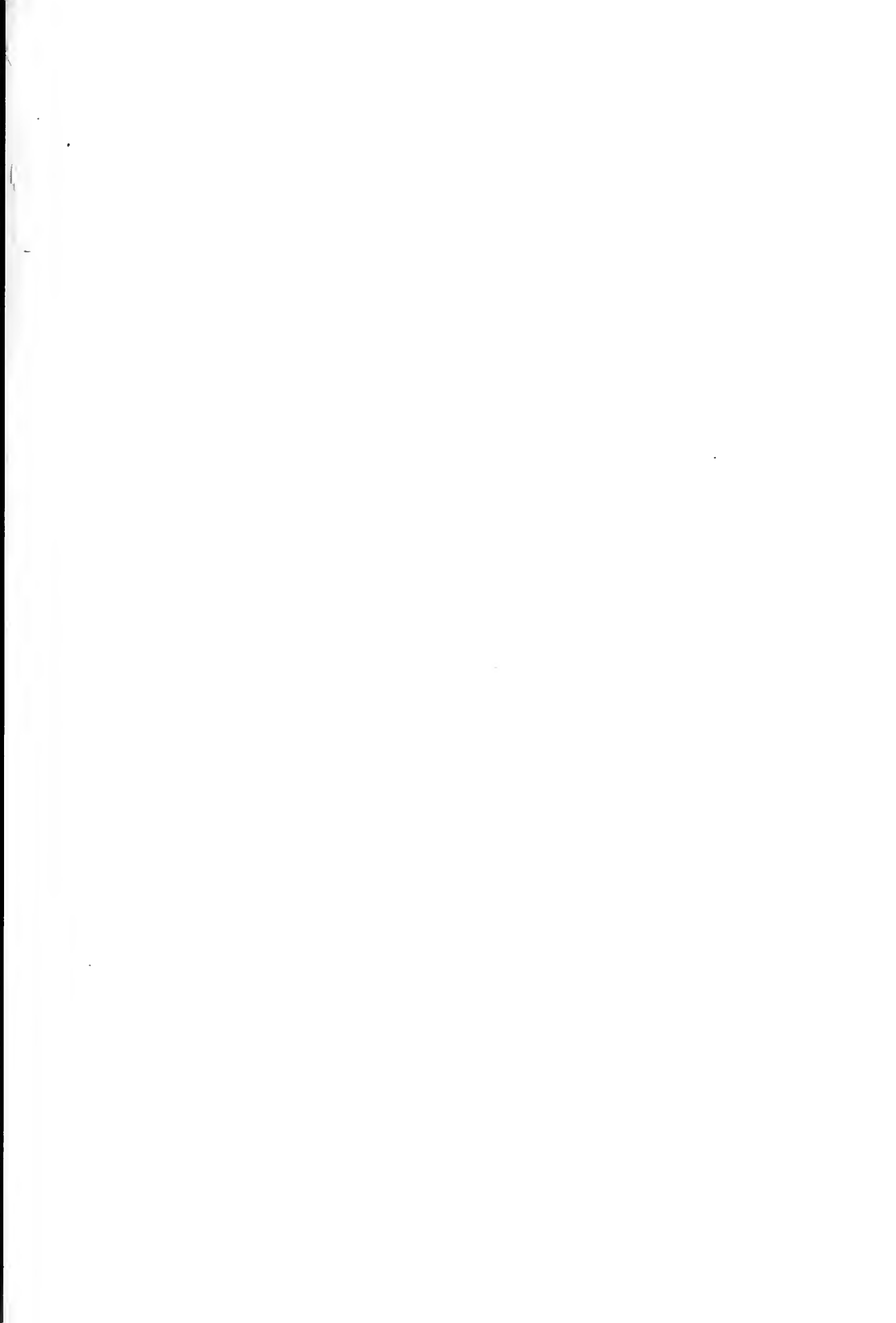
41. In a magnetic phonograph or telephonograph apparatus, the combination of a series of spools or sets of spools rotating together upon a common shaft or shafts and each containing a separate section or subdivision of the record-wire of said apparatus, a recording-magnet for said record-wire in circuit with or otherwise arranged to be operated by a distant telephonic transmitter for the purpose of producing a magnetic record upon said wire, means for independently reproducing the record or portions thereof impressed upon the several sections or subdivisions of said wire, and means for operating the various portions of said apparatus upon a "time-unit" basis, whereby reference to the information or intelligence recorded thereby, for the purpose of reproduction thereof, is facilitated.

Signed at New York, in the county of New York and State of New York, this 21st day of February, A. D. 1903.

ELIAS E. RIES.

Witnesses:

WM. GOLDBURG,
M. E. BELL.



No. 774,100.

PATENTED NOV. 1, 1904.

C. W. NOYES.
PHONOGRAPH.

APPLICATION FILED NOV. 12, 1903.

NO MODEL.

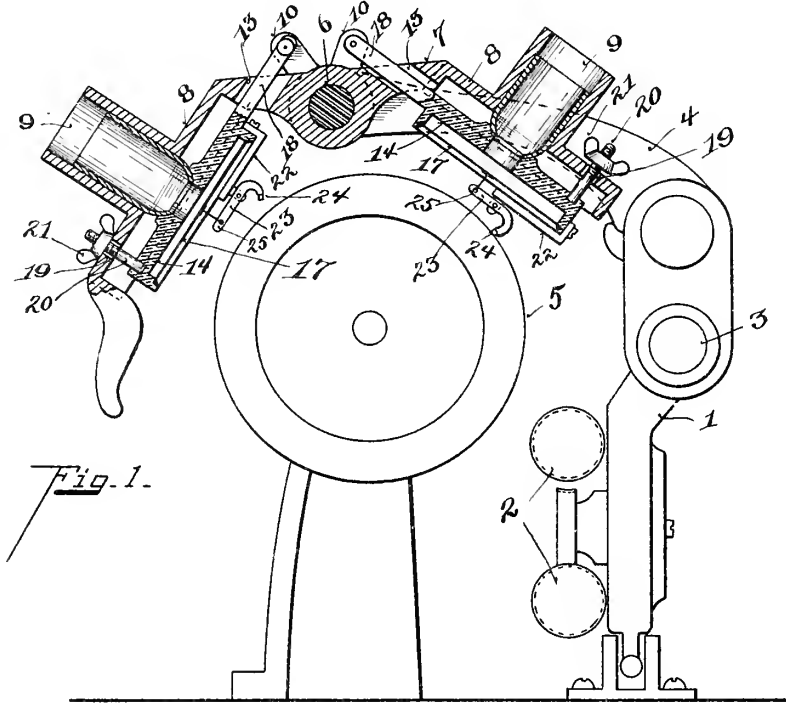


Fig. 1.

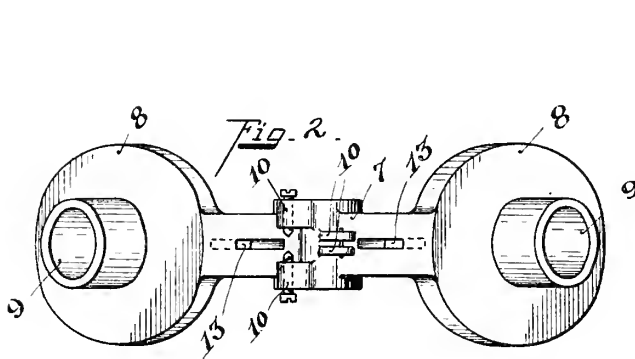


Fig. 2.

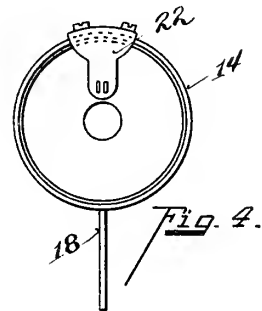


Fig. 4.

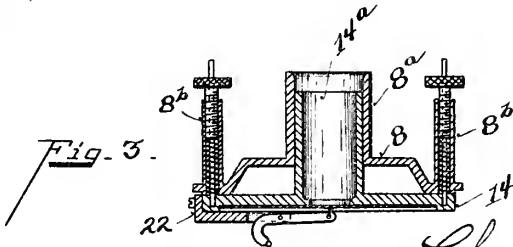


Fig. 3.

Inventor

Witnesses

Oliver B. Kaiser
Louis Beck

384

Charles W. Noyes
Wood J. Wood
Attorney

UNITED STATES PATENT OFFICE.

CHARLES W. NOYES, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO
JOHN H. MITCHELL, OF CINCINNATI, OHIO.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 774,100, dated November 1, 1904.

Application filed November 12, 1903. Serial No. 180,969. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. NOYES, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to a phonograph.

One of the objects of my invention is to provide a carrier from the opposite sides of which are suspended a reproducer and a recorder having the same co-relative position to the record, whereby they have a coincident path of stylate travel.

Other features and objects of my invention are more fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is an end elevation, partly in section. Fig. 2 is a top plan view of the carrier. Fig. 3 is a detail sectional view of a modified form of shell and holder. Fig. 4 is a plan view of the diaphragm-holder.

I have only shown so much of a complete instrument as will serve to diagram the essential relative positions of my improvements to the other parts of the instrument.

1 represents the main support, which is reciprocated by driving mechanism 2. The mechanism herein shown and described forms a part of a complete machine upon which a separate application will be made; but it may be used as a constituent part of an ordinary phonograph.

3 represents the cross guide-rod, upon which a support 1 travels.

4 represents a swivel-arm the fixed end of which is fulcrumed to the support 1. In the upper end of the arm 4, overhanging the record 5, is a swivel-bolt 6.

7 represents a carrier fixed to the swivel-bolt 6. Said carrier has on the opposite sides the duplicate shells 8, inclined in coincident angle relative to the carrier 7, one shell carrying the reproducer and the other the recorder. Each shell carries the usual sound-transmitting tube 9.

The carrier 7 has two pairs of bracket-arms 10. The carrier 7 is provided with the slots 13.

14 represents the diaphragm-holder to which the diaphragm 17 is attached. The holders 14 are provided with the tube 14^b, telescoping with the tubes 9. Each holder has an arm 18 passing through the slot 13 of the carrier. The inner ends of said arms 18 are pivotally supported between the bracket-arms 10. The shells 8 are provided with the slots 19, through which pass the adjusting-screws 20, the inner ends of which fixedly engage the outer ends of the diaphragm-holder 14. These bolts are provided with adjusting-nuts 21 on their outer ends, which serve to limit the movement of the diaphragm-holder relative to the supporting-shell 8.

It is obvious that the diaphragm-holders through their arms have a pivotal movement bodily to and from the record-surface.

22 represents pivot-plates affixed to the outside of the peripheral walls of the diaphragm-holder 14 and extending across the outside of the diaphragms 17. 23 represents the stylus-levers pivoted to said plates 22, said levers carrying the jewel stylus-points 24, the other ends, 25, of said levers being attached to the centers of the diaphragms in the usual manner.

As a modification I have shown in Fig. 3 the shell 8 provided with a tube 8^a. The diaphragm-holder has no arm pivotally connecting it to the carrier; but the diaphragm-holder 14 has a tube 14^a telescoping with tube 8^a. The shell 8 has the two spring-controlled pistons 8^b, the ends of which engage through said shell and take into the periphery of said diaphragm-holder upon opposite sides. The stylus pivot-plate 22 is the same. Obviously this arrangement permits the diaphragm-holder to bodily move to and from the record by sliding telescoping action; but the result is substantially the same as the swinging pivotal action incident to the arrangement of Fig. 1. This result is that the inclination of the diaphragm relative to the stylus oscillations is invariable. Records, owing to contraction, expansion, imperfection, or accident, possess many inequalities other than the stylus indentations *per se*. If the stylus follows such inequalities other than sound in-

dentations of the record and the diaphragm does not, except as influenced by the stylus, obviously these inequalities and variations vary the normal sound recording or transmitting functions of the diaphragm, and the result is imperfect.

In my device the diaphragm responds bodily to these artificial record irregularities, so that the stylus movement relative to the diaphragm is only such as is caused by the former influence of the diaphragm on the stylus transmitted to the record or caused by the influence of the record on the stylus and transmitted to the diaphragm. To all of these artificial imperfections the diaphragm-holder, diaphragm, and stylus conform as a unit.

My invention is primarily designed for use in a commercial phonograph, although its features are of equal value to any instrument. The mounting of the reproducer and recorder at the same angle on a common carrier intermediately pivoted to the frame of the machine and movable in the arc of a circle to and from the center of the record, so as to alternately engage opposite sides of the periphery of the record, permits these alternative instruments to be interchangeably used at will by the simple tilting of the carrier in either direction. Manifestly this simple movement throws one stylus identically into the path of the other, and the change can be availed of instantly without the slightest inconvenience to the operator.

I intend the term "reproducer" to cover the term "recorder" as well.

Having described my invention, I claim—

1. In a phonograph, a carrier intermediately fulcrumed, a recorder and reproducer, suspended from the opposite sides of said carrier, overhanging the opposite sides of the periphery of the record, and adapted to be alternately swung to and from the record, whereby the two stylus-points alternately pursue a

coincident path of travel upon opposite sides of the record, substantially as described. 45

2. In a phonograph, a carrier intermediately fulcrumed, a reproducer and a recorder suspended over the record upon opposite sides of the carrier and at the same angle relative thereto whereby the stylus-points have an alternative coincident path of travel upon opposite sides of the record, substantially as described. 50

3. In a phonograph, a traveling support, having an arm suspended over the record, a carrier intermediately fulcrumed on said arm, and having shells, depending from opposite sides of said fulcrum, a recording instrument supported in one shell and a reproducing instrument supported in the opposite shell, said shells being depended upon opposite sides of the periphery of the record whereby the stylus-points have an alternative coincident path of travel upon opposite sides of the record, substantially as described. 55 60 65

4. In a phonograph, a traveling support, having an arm overhanging the record, a carrier intermediately fulcrumed on said arm, said carrier having duplicate shells depending from opposite sides of said fulcrum, and overhanging upon opposite sides of the periphery of the record, a recording instrument supported in one shell, and a reproducing instrument supported in the other shell, said shells being counterbalanced, whereby when one instrument is swung into commission, the other is swung out, the stylus-points thereby having an alternative coincident path of travel upon opposite sides of the record, substantially as described. 70 75 80

In testimony whereof I have hereunto set my hand.

CHARLES W. NOYES.

Witnesses:

OLIVER B. KAISER,
LUISE BECK.

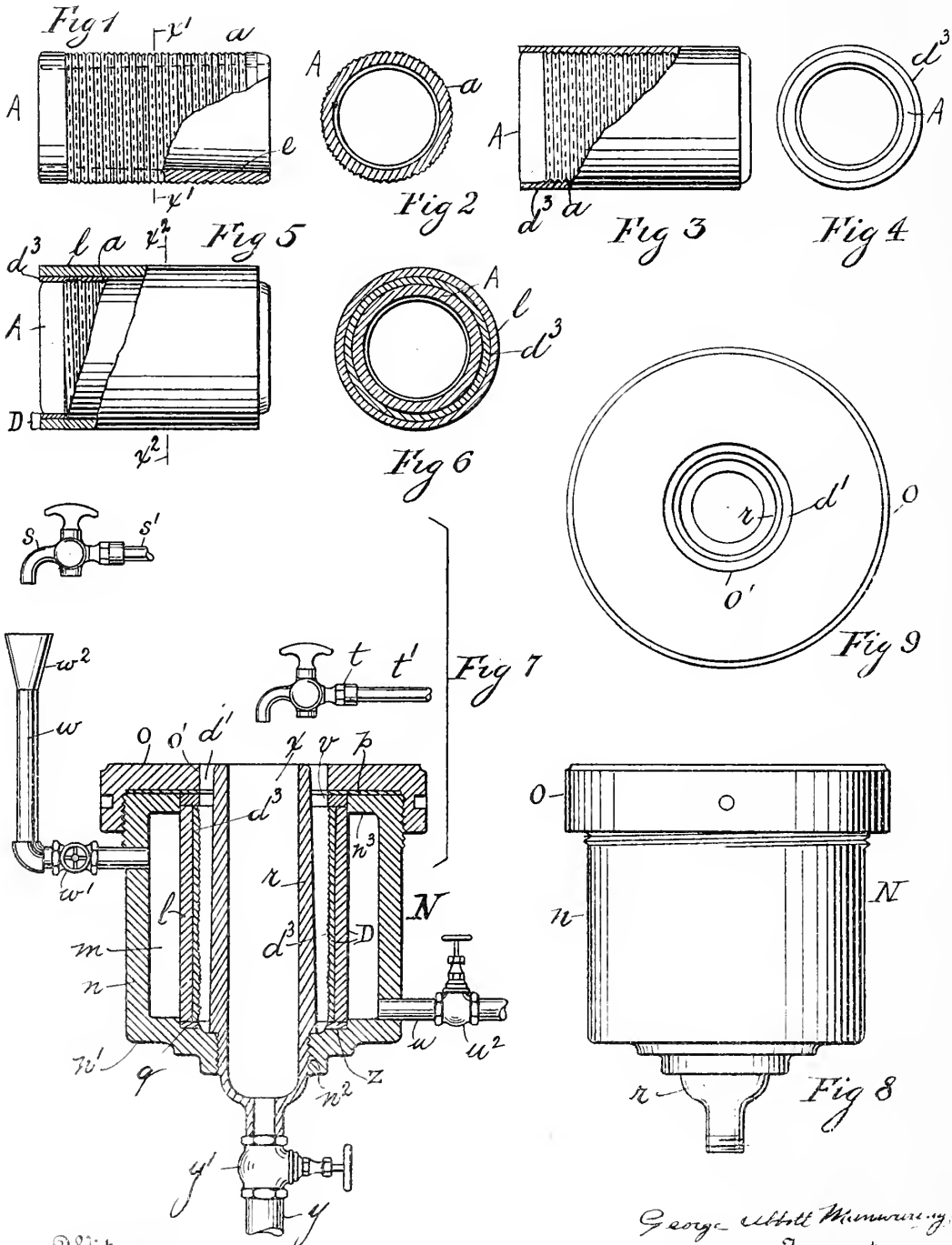


G. A. MANWARING.
METHOD OF DUPLICATING SOUND RECORDS.

APPLICATION FILED MAR. 30, 1904.

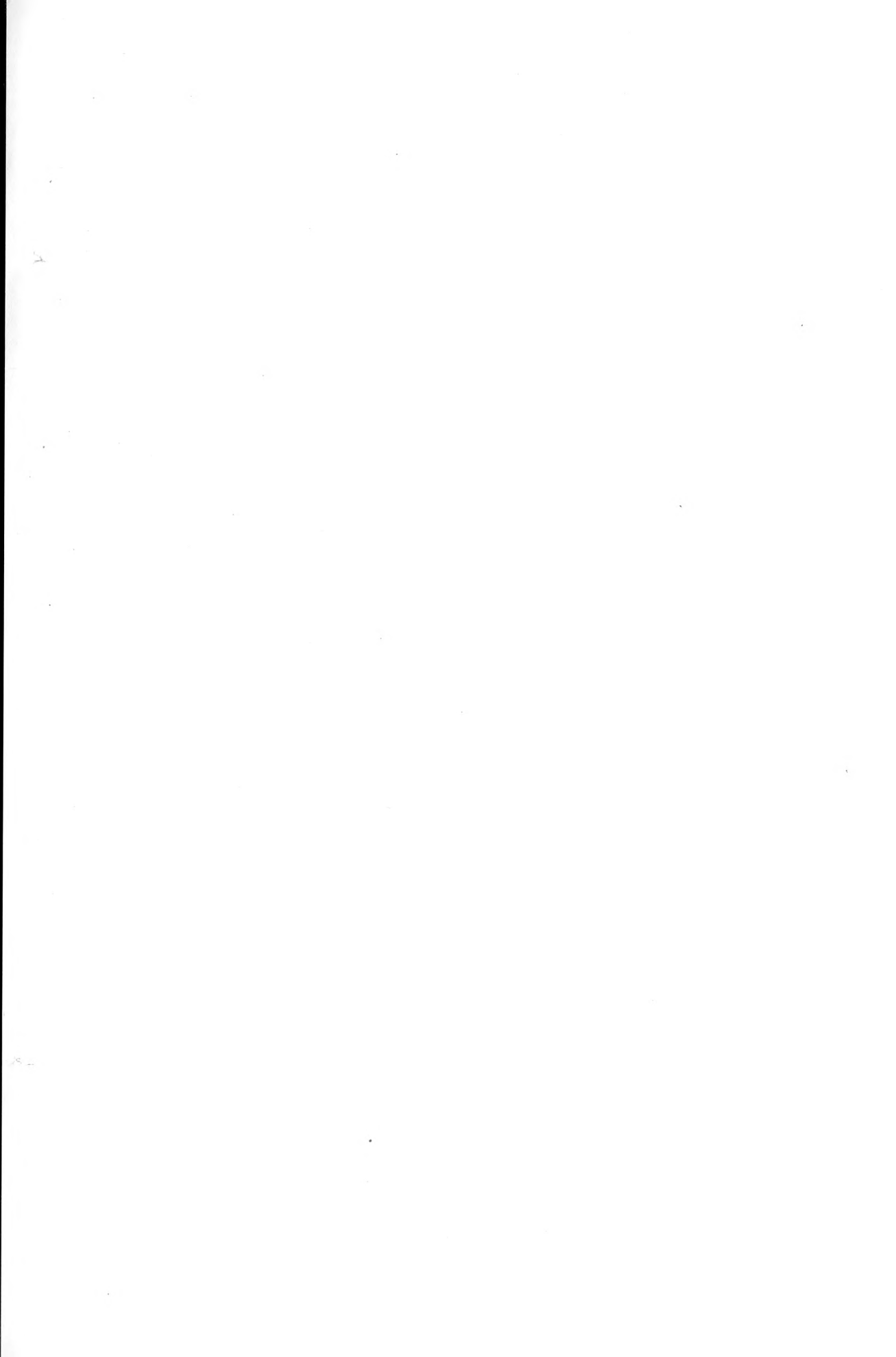
NO MODEL.

2 SHEETS—SHEET 1.



Witnesses
J. W. Emerson
J. W. Reynard

George Abbott Manwaring
 Inventor

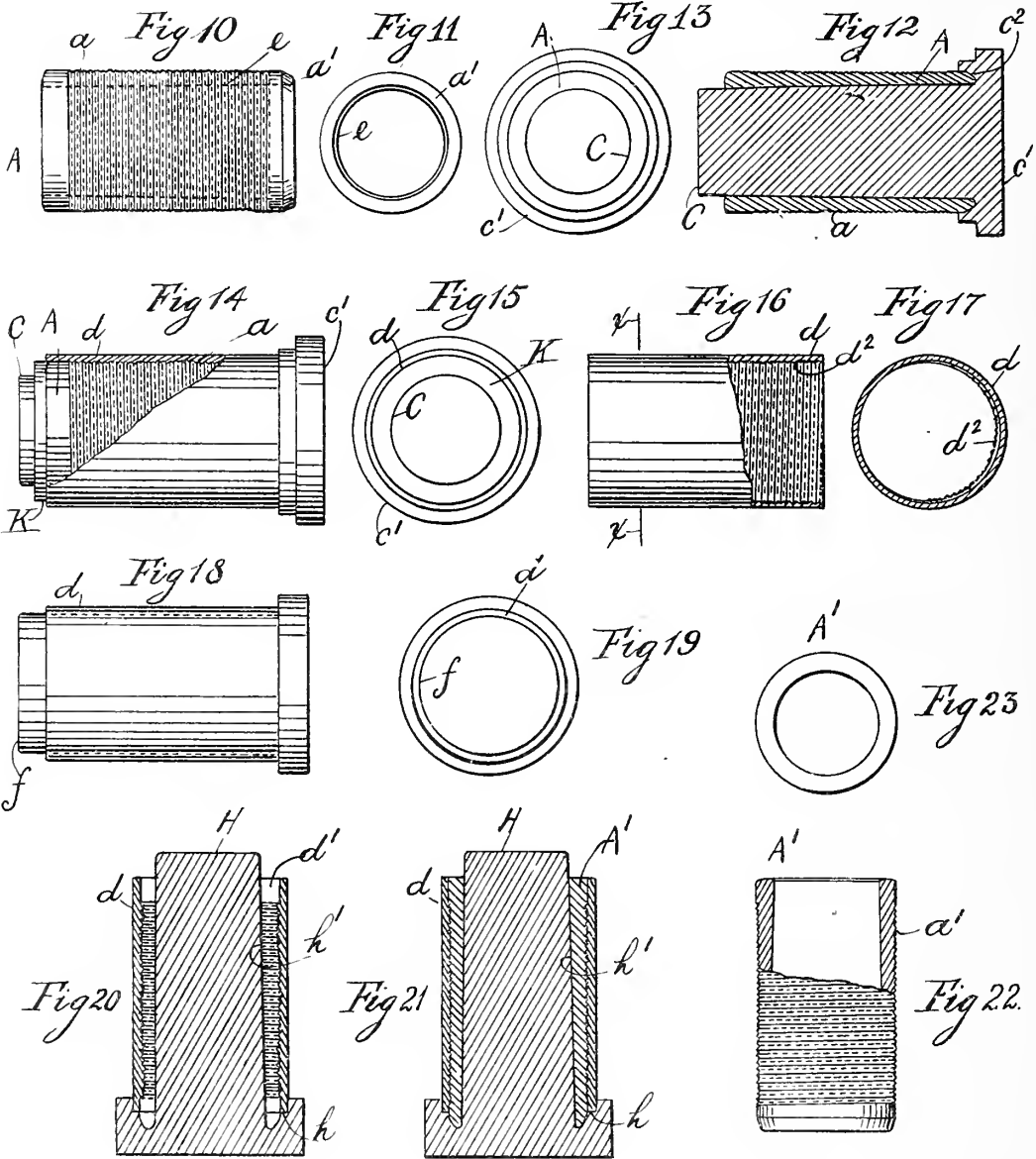


G. A. MANWARING.
METHOD OF DUPLICATING SOUND RECORDS.

APPLICATION FILED MAR. 30, 1904.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses
[Signature]
[Signature]

George Abbott Manwaring
 Inventor

UNITED STATES PATENT OFFICE.

GEORGE ABBOTT MANWARING, OF BAYONNE, NEW JERSEY, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

METHOD OF DUPLICATING SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 774,192, dated November 8, 1904.

Application filed March 30, 1904. Serial No. 200,771. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ABBOTT MANWARING, a citizen of the United States, residing at Bayonne, county of Hudson, and State of New Jersey, have invented a new and useful Improvement in Methods of Duplicating Sound-Records, of which the following is a specification.

My invention relates to a process or method of making records for talking-machines; and its object comprises the steps necessary to produce such records when employing the expansion of molds or matrices in which such records are formed.

Records for talking-machines are generally made by electroplating the original or master record, backing the thin plated shell thereby obtained with lead or the like for strength, and then removing the original or master record, leaving the hollow reverse copy or matrix for the insertion of material to form a copy or reproduction of the original record. Heretofore in the reproduction of such records it has been necessary to use material that would shrink away from the matrix or mold when cooling to allow its removal from the said matrix or hollow reverse copy of the master-record. This renders available a much wider range of material for making the duplicates.

My invention comprises the expansion of a matrix to enable the employment of material for the reproduction which does not require shrinking to be removed from the said matrix, allowing the employment of paper with a surface coating or other material that will not permit being contracted to take the impressions from the matrix.

My invention broadly consists in the method of separating the reproduction of the record from its surrounding matrix by means of the expansion of the said matrix instead of by the contraction of the reproduction. To carry out my invention, I can expand the said matrix either by chemicals or solutions thereof or by other means, as by the application of heat to the matrix while the reproduction is kept relatively cool. I attain these ends by the

means illustrated in the accompanying drawings, in which—

Figure 1 represents a partial front view and longitudinal section of a master-record. Fig. 2 is a section of Fig. 1 on the line $a'a'$. Fig. 3 represents a partial outside front view and axial section of a coating on a master-record. Fig. 4 is an end view of Fig. 3. Fig. 5 represents the elements shown in Fig. 3 with a backing on the coating, shown partly in section. Fig. 6 is a section of Fig. 5 on the line $b'b'$. Fig. 7 represents an axial section of an apparatus with the matrix or reverse copy therein for forming the reproduction, some of the said apparatus being shown in full. Fig. 8 is a partial side view of Fig. 7. Fig. 9 represents a top view of Fig. 8. Fig. 10 represents an outside view of an original or master record. Fig. 11 shows an end view of Fig. 10. Fig. 12 is an axial section of the master-record mounted on a mandrel. Fig. 13 shows an end view of Fig. 12. Fig. 14 represents the same elements as shown in Fig. 12 with a matrix on the master-record, partly in section. Fig. 15 is an end view of Fig. 14. Fig. 16 represents an outside front view and partial axial section of the matrix or reverse copy of the master. Fig. 17 is a section on the line $c'c'$ of Fig. 16. Fig. 18 represents an outside view of the matrix or reverse copy on a holder or shaper. Fig. 19 shows an end view of Fig. 18. Fig. 20 represents an axial section of the matrix on a holder somewhat smaller in diameter than said matrix. Fig. 21 represents the elements shown in Fig. 20 with the material in place to form the reproduction of the master-record. Fig. 22 shows an outside view and axial section of the completed reproduction of the master-record. Fig. 23 is a top view of Fig. 22.

The appurtenances and steps of my invention comprise a master-record A, of the usual cylindrical shape, with a tapering internal surface and indentations or impressions on its outer surface in helical paths around the same.

My preferred way of carrying out the invention consists in covering the master-record

A with a suitable coating d^3 , Fig. 3, of copper or the like, by electroplating or the like, and then reinforcing the said coating d^3 by a suitable material l to strengthen the thin metallic coating, the combination forming a matrix, (designated by the letter D.) If desirable, the coating d^3 can be made sufficiently thick for strength to avoid applying the extra reinforcing material l . The master-record is now removed from the said matrix D by shrinking it therefrom or detaching it by any other means, after which the said matrix is placed into a receptacle N. The said receptacle consists of the walls n , extending from a bottom n' , that has formed therein a shoulder q , which latter is threaded through its central portion n^2 . A packing-ring z is placed on the shoulder q and supports the matrix D, which latter carries a ring r , that fits in the annular projection n^3 , extending horizontally from the walls n . A packing-ring p covers both the ring r and projection n^3 . A hollow core v is screwed into the threaded portion n^2 of the receptacle and has its outside surface tapered to correspond to the internal surface of a master-record. Inlet-piping w , with a valve w' and funnel w^2 , is attached to the upper portion of the wall n , while outlet-piping u , with the valve u^2 , is connected to the lower portion thereof, and the outlet-piping y , with the valve y' , extends from the hollow core v . A faucet s , with piping s' , is arranged over the funnel w^2 , and a faucet t , with the piping t' , is located over the hollow core v . A cover O, with a central piping o' , is screwed on the top of the receptacle. After the matrix D has been placed into the receptacle N and made to bear upon the packing-ring z the ring r is put in place with the packing p and cover o , which latter is screwed down to securely hold the said matrix, while at the same time fluid-tight joints are made with the ring z and packing p . Next the material to form the reproduction is introduced into the space d' by being poured or forced therein or in any suitable manner. The said material will conform to the tapered core v , forming the inner surface of the reproduction, and also to the form of the matrix D to form the outside cylindrical surface of the reproduction with its indentations or impressions. A liquid is circulated through the hollow core v in the direction of its longitudinal axis by means of the piping t and y to maintain the reproduction at a comparatively low temperature, and a warmer liquid is circulated in the space m by means of the piping w and u , to expand the matrix D away from the said reproduction, after which the latter can be removed from the receptacle N by taking off the cover o , packing p , and ring r , obtaining a copy of the master-record, which is then properly trimmed on its edges.

A modification of my method is to place the record A on a holder C, having a base c' with

a circular groove c^2 corresponding to the edge d' of the master-record. Then a coating of gelatin or the like is formed on the master-record by either dipping the same in a solution thereof, brushing it on, or allowing the solution to flow over the record. The coating is allowed to dry or harden in place, forming the matrix d , which is securely held on the mandrel C by the ring K, the latter being tightly secured on said mandrel. The matrix d is next expanded, generally by moistening the same, until it becomes sufficiently enlarged to slip off the master-record and mandrel without injury to its indentations or impressions and which latter to prevent confusion are designated by the letter d^2 . The next step is to place the matrix d on a holder f to allow it to dry, harden, and shrink to the size and shape required to produce the reproduction of the same diameter and shape as the master-record. The matrix d is now placed on a shoulder h of a holder H, the sides h I of said holder being of a diameter and inclination equivalent to the internal surface of a master-record. Next the material A' for forming the reproduction is poured or placed by any suitable means into the annular space d' between the holder H and the matrix d and allowed to cool, after which the matrix d is expanded by moistening the same and separated from the reproduction A'. The matrix d is then again placed on the holder f to repeat the steps from that point on, the completed reproduction A' being shown with its indentations or impressions d^2 .

Having described my invention, I claim—

1. The process of obtaining duplicate sound-records, which consists of forming within a matrix a duplicate record of suitable material, and then expanding said matrix to disengage it from said duplicate.

2. The method of producing talking-machine records, consisting in making a hollow matrix with impressions therein, inserting a material in the matrix, forming a reversed copy on the said material of the said impressions, and expanding the matrix from the said material.

3. The method of producing talking-machine records, consisting in making a hollow matrix with impressions therein, inserting a material in the matrix, forming a reversed copy on the said material of the impressions on the matrix, and then heating the matrix to expand it from the said material.

4. The method of producing talking-machine records, consisting in covering a master-record with a coating to form a matrix, removing the master-record from the matrix, placing a material in the matrix to form the record, maintaining the means to hold the said material in the matrix at a lower temperature than the said matrix, expanding the matrix, and removing the record.

5. The method of producing the talking-

machine records, consisting in covering a master-record with a coating to form a matrix having impressions on its internal surface reversed from the master-record, circulating a fluid, through the longitudinal axis of the record, circulating a fluid on the outside of the matrix, of a higher temperature than the fluid circulating through the axis of the record, to expand the matrix from the record, and removing the matrix from the record.

6. The method of making reproductions of talking-machine records, consisting in electroplating a metallic coating on a record to form a matrix having impressions on its internal surface, reversed from the impressions of the said record, strengthening the coating

with a backing, placing the record material within the matrix, circulating a fluid through the longitudinal axis of the record to maintain the reproduction at a lower temperature than the matrix, circulating a warmer fluid on the outside of the matrix to expand the latter, and removing the reproduction from the matrix.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 25th day of March, 1904.

GEORGE ABBOTT MANWARING.

Witnesses:

C. A. L. MASSIE,
R. L. SCOTT.



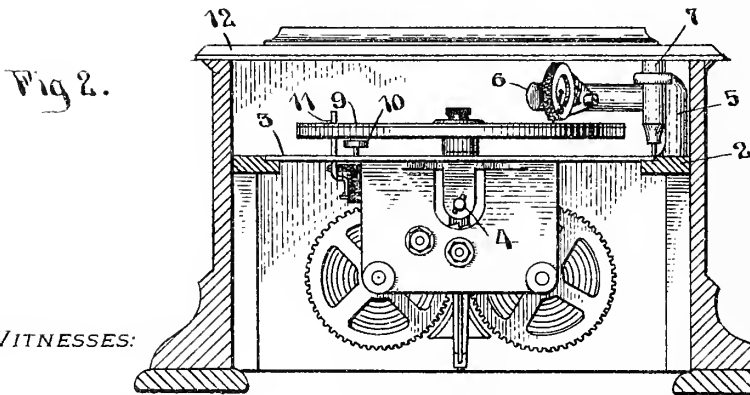
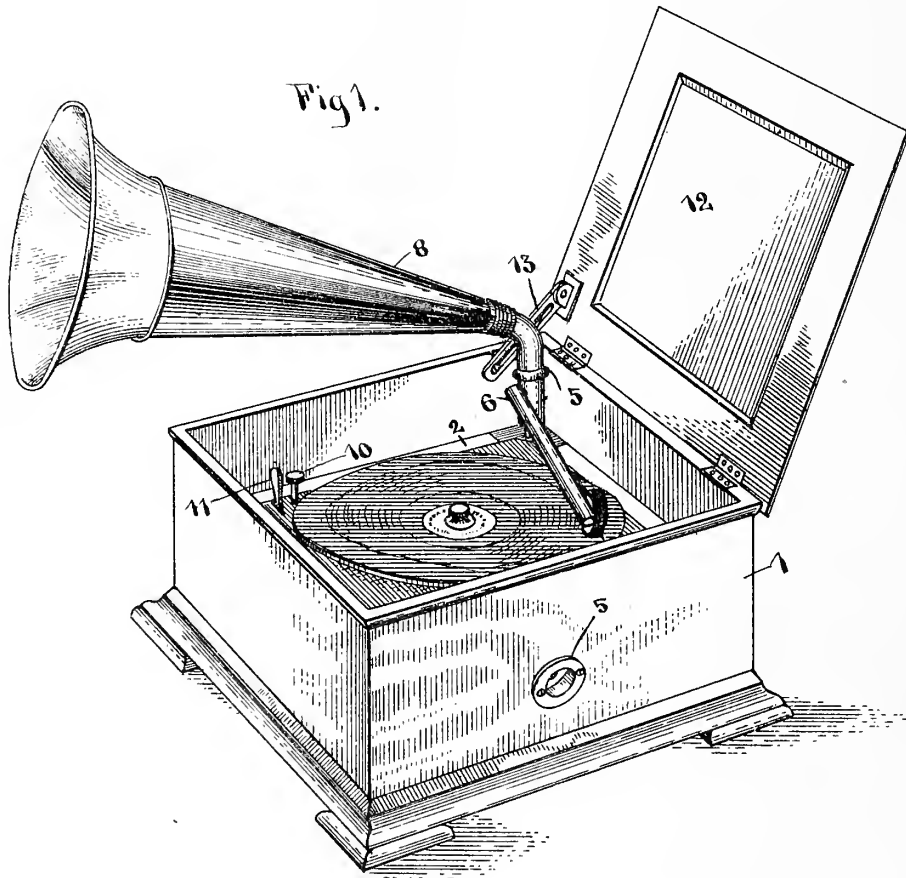


No. 774,435.

PATENTED NOV. 8, 1904.

E. R. JOHNSON.
CABINET FOR TALKING MACHINES.
APPLICATION FILED NOV. 19, 1902.

NO MODEL.



WITNESSES:

Edu. W. Vaill Jr.
Chas. H. Bennett

INVENTOR:

Eldridge R. Johnson
by *Stone, Pettis,*
ATTORNEY:

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

CABINET FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 774,435, dated November 8, 1904.

Application filed November 19, 1902. Serial No. 131,963. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Cabinets for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The general nature of this invention consists in providing a talking-machine of the hollow-arm type with a cabinet within which all of the movable parts of the machine may be more efficiently and completely inclosed than heretofore and which when the machine is not in use will have a pleasing and attractive appearance in any room in which the machine may be placed.

For a full, clear, and exact description of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a perspective view showing the parts of the machine and cabinet in the position during operation; and Fig. 2 is a side elevation of the cabinet, showing one end thereof removed and the parts of the motor and turntable in elevation.

The numeral 1 indicates a substantially rectangular box or casing, around the interior walls of which, a suitable distance from their upper edges, is supported a rectangular frame or ledge 2. Upon this ledge or frame rests the supporting-plate 3 of the machine-motor and turn-table or record-carrier, the winding-shaft 4 of the former being adapted to be reached by a suitable opening 5 in one side of the box or casing. Upon this ledge or frame, at one corner thereof, is fixed the standard or bracket 5 for supporting the sound-box or reproducer-arm 6. Said support carries at its upper end a tubular portion 7, which is adapted to receive and support the end of the amplifying-horn 8.

9 indicates the record and turn-table, while 10 and 11 indicate the speed-regulating screw and the starting and stopping lever, respectively.

A cover 12 is hinged to one of the upper

edges of the box in the usual manner and is provided with a link 13 for limiting its backward movement when open.

When the machine is not in use, the amplifying-horn 8 is removed from the reproducer-arm support and the cover is closed. It will be noticed when in this condition that all the working parts of the machine are completely hidden from view and are at the same time protected from dust and objects which may accidentally come in contact therewith.

A rectangular box or casing as above described is especially adapted to contain a talking-machine of the type mentioned because of the fact that the distance from the center of the axis of rotation of the turntable to the pivot of the reproducer-arm is greater in a square or rectangle than in any other figure having a symmetrical contour. One-half of the length of a diagonal of a square box which is of the requisite dimensions to contain a turn-table and motor of a particular size will give approximately the most desirable and efficient length for the reproducer-arm.

By the particular manner of supporting the motor above described said motor and turntable may be easily removed for inspection or repair without disturbing other parts of the apparatus. From the fact that the sound-box-arm support 5 is located at the rear corner of the casing the amplifying-horn 8 when in position projects a minimum distance beyond the front of the box, and by reason of the cover extending in an upright position behind said horn the same is protected from being injured by carelessness or accident.

Having thus described my invention, what I claim, and desire to protect by Letters Patent of the United States, is—

1. The combination of a receptacle open at the top, a movable cover therefor, adapted, when opened, to expose the contents thereof and permit access thereto, a motor, record-carrier, reproducer-arm support, and reproducer-arm, all mounted upon, and located wholly within, the confines of the body portion of said receptacle and below the open top

thereof, and an amplifying-horn adapted to
be removably mounted upon said support and
extend beyond the confines of said receptacle
when said cover is opened, said cover being
5 adapted to be closed when the horn is removed
and to close the top of the receptacle and en-
tirely inclose the contents thereof.

2. The combination of a receptacle having
an interior supporting-ledge below the upper
10 edge thereof, a record-carrier and motor
mounted thereon, a support for an amplify-

ing-horn upon said ledge, a reproducer-arm
mounted upon said support, and a cover for
said receptacle, said record-carrier support
and arm being wholly within the confines of 15
the body portion of said receptacle.

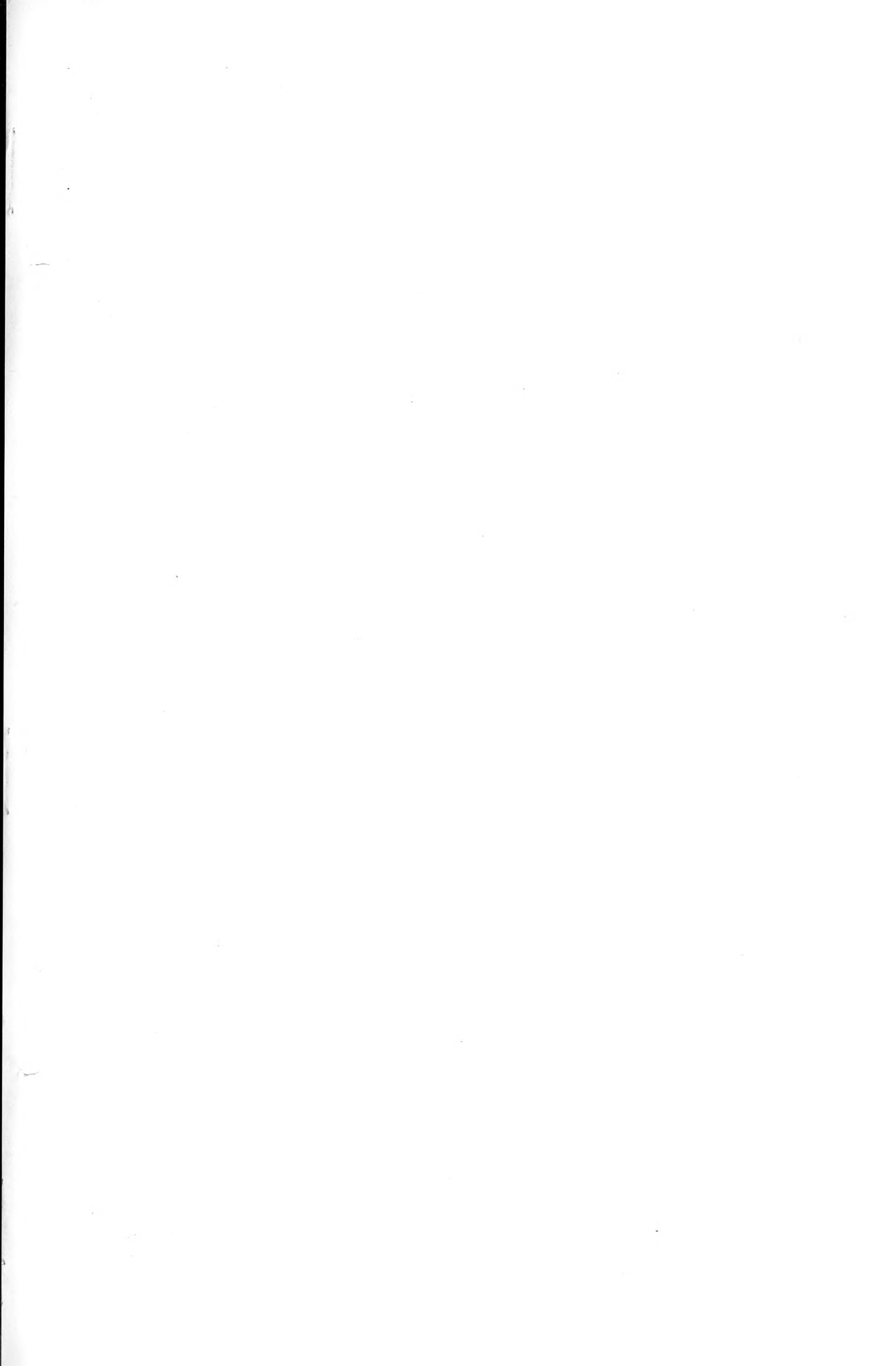
In witness whereof I have hereunto set my
hand this 17th day of November, A. D. 1902.

ELDRIDGE R. JOHNSON.

Witnesses:

JOHN F. GRODY,

EDWARD W. VAILL, JR.



No. 774,482.

PATENTED NOV. 8, 1904.

N. L. LEWIS.
TALKING MACHINE.

APPLICATION FILED FEB. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 1.

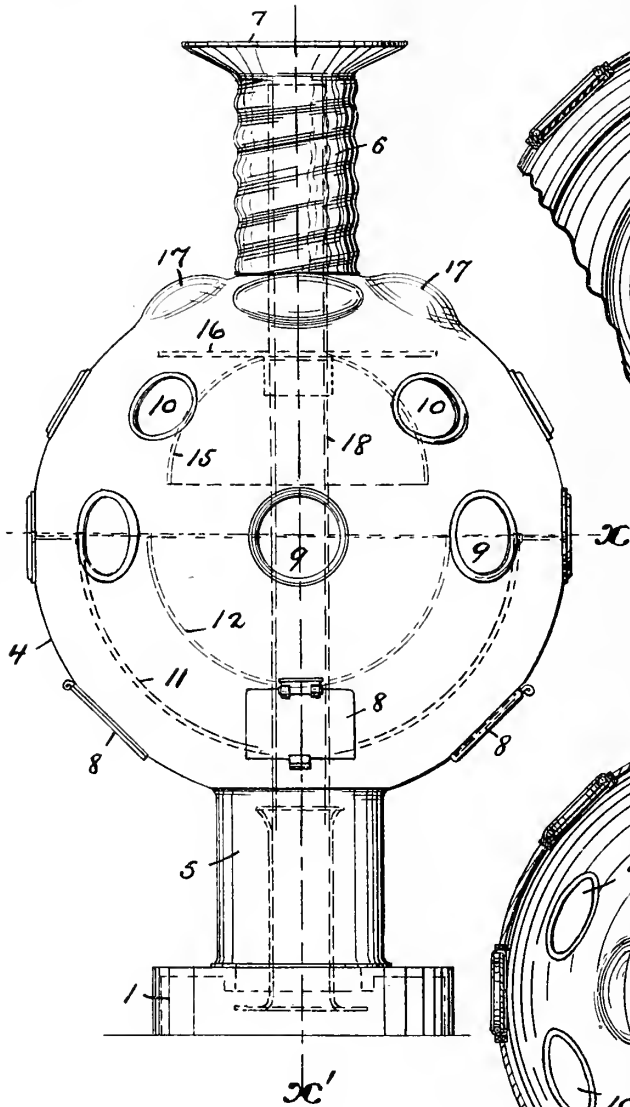


Fig. 1.

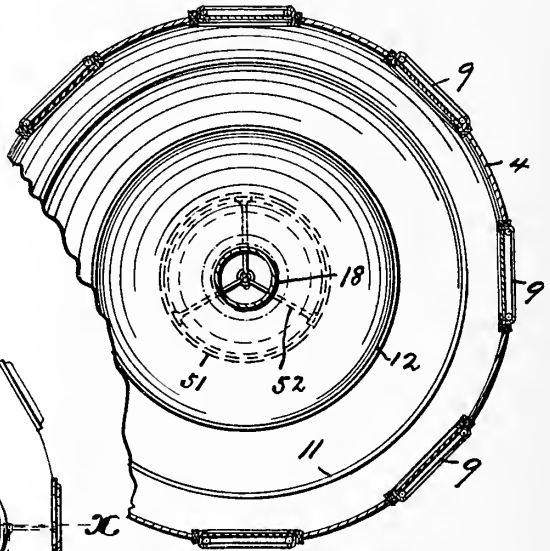


Fig. 2.

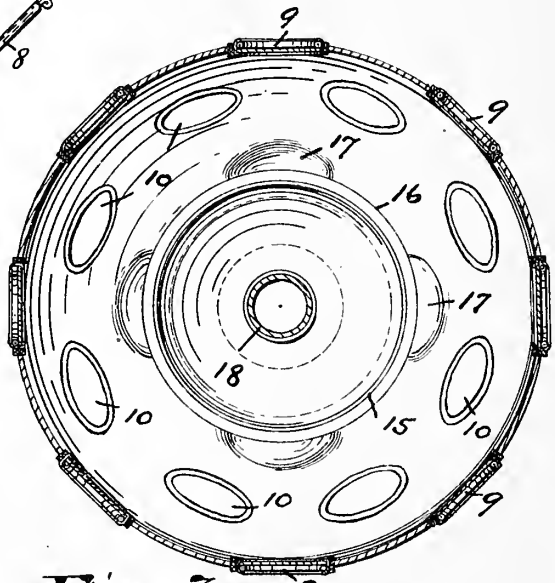


Fig. 3.

WITNESSES:

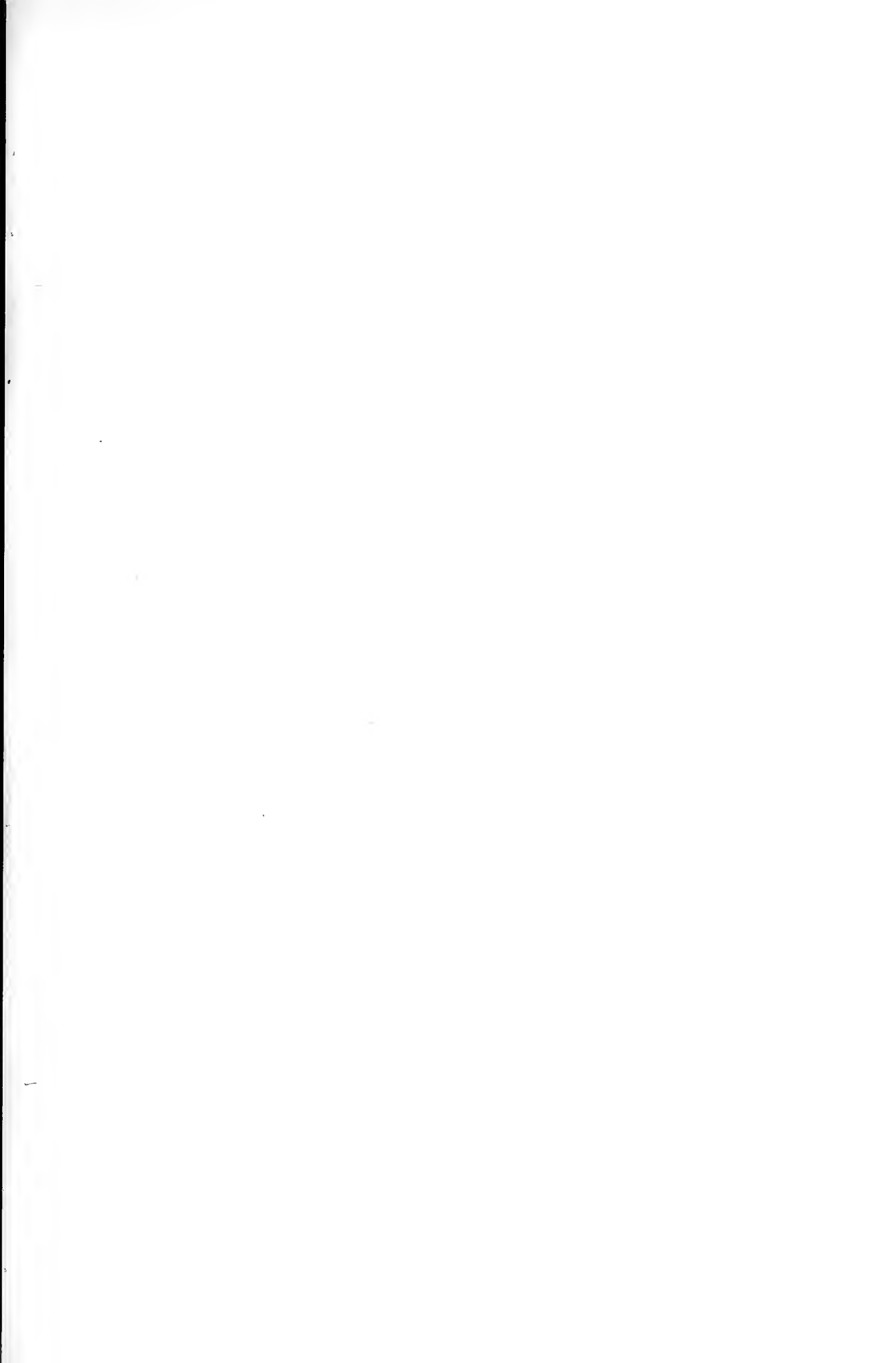
Henry Hug
Russell M. Everett

INVENTOR:

Nathan L. Lewis,

BY

Drake & Co.
 ATTORNEYS.

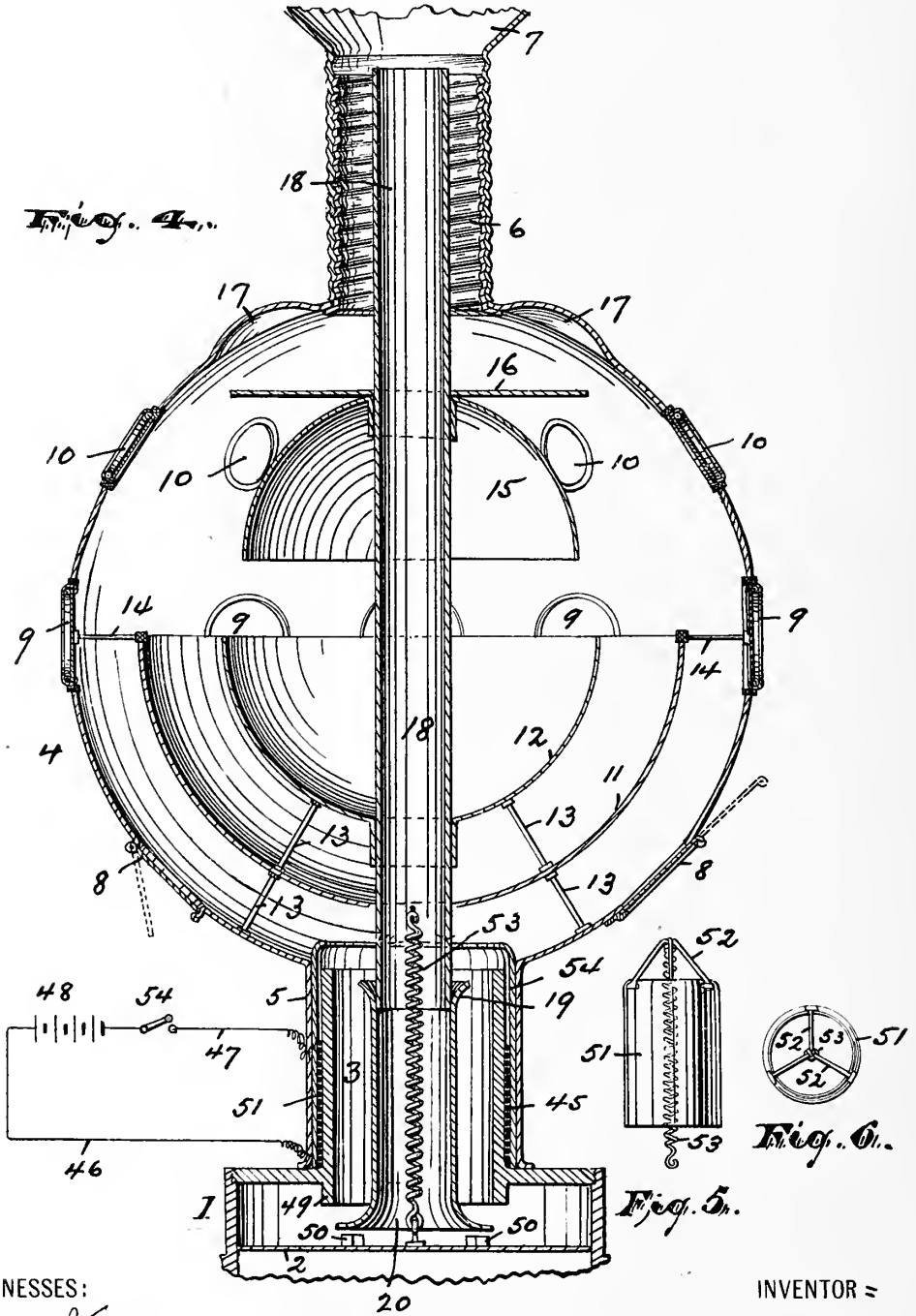


N. L. LEWIS.
TALKING MACHINE.

APPLICATION FILED FEB. 28, 1903.

NO MODEL.

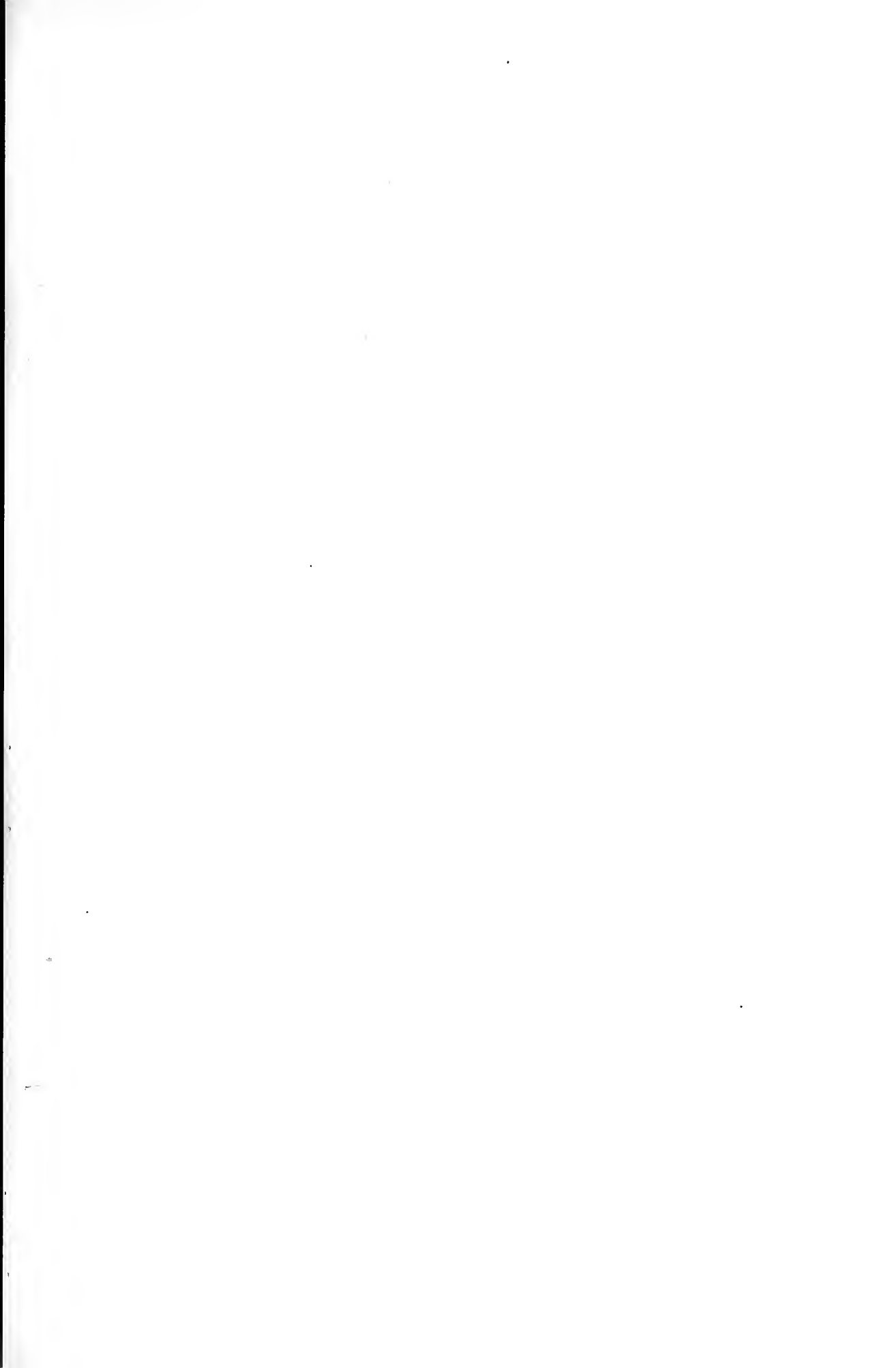
5 SHEETS—SHEET 2.



WITNESSES:
Henry King
Russell M. Everett

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N. L. LEWIS.
TALKING MACHINE.

APPLICATION FILED FEB. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 3.

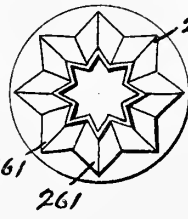
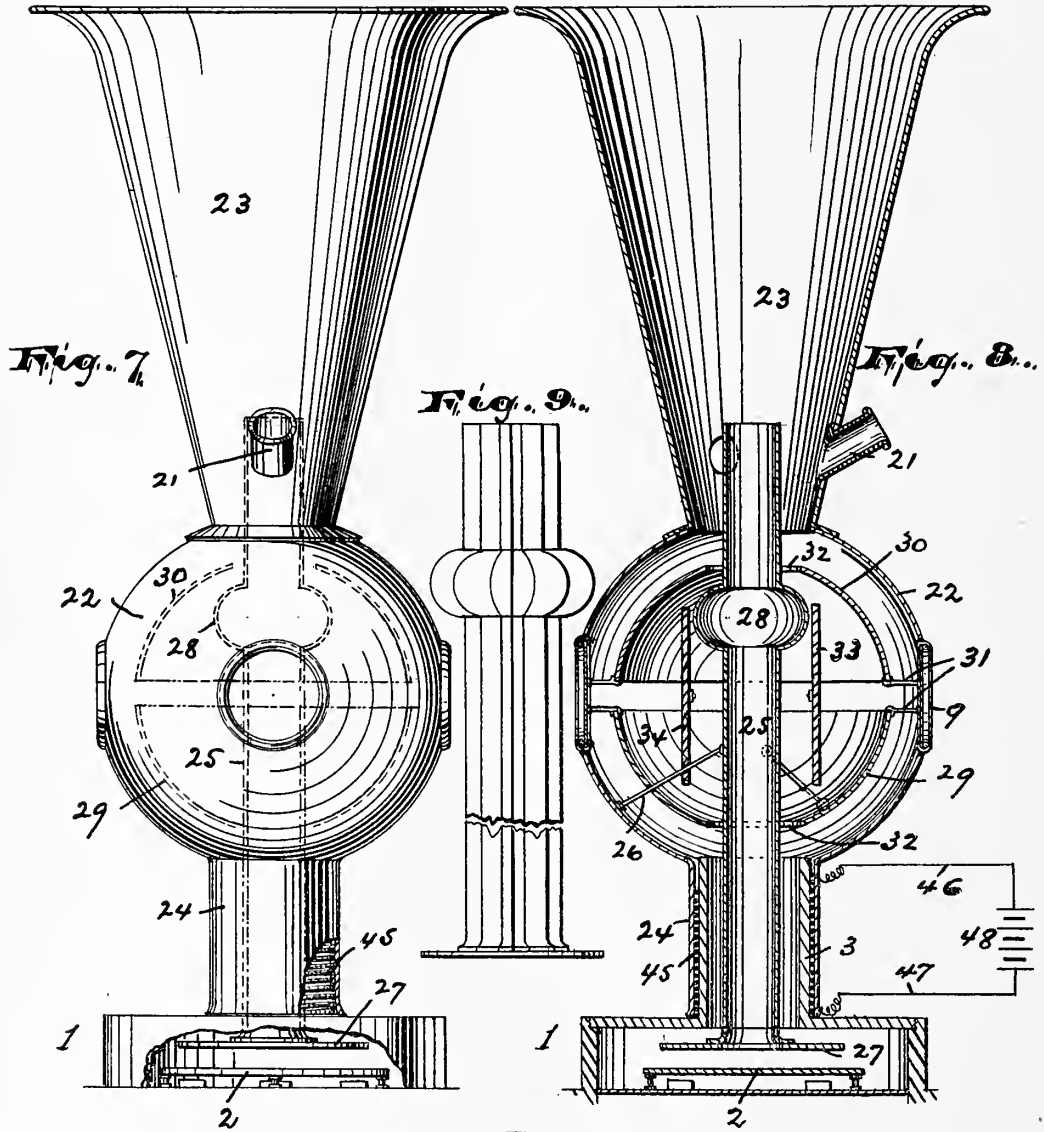


Fig. 10.

WITNESSES:

Remy Tracy
Russell M. Everett

INVENTOR=

Nathan L. Lewis,

BY *Drake & Co.,*

ATTORNEYS=



No. 774,482.

PATENTED NOV. 8, 1904.

N. L. LEWIS.
TALKING MACHINE.

APPLICATION FILED FEB. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 4.

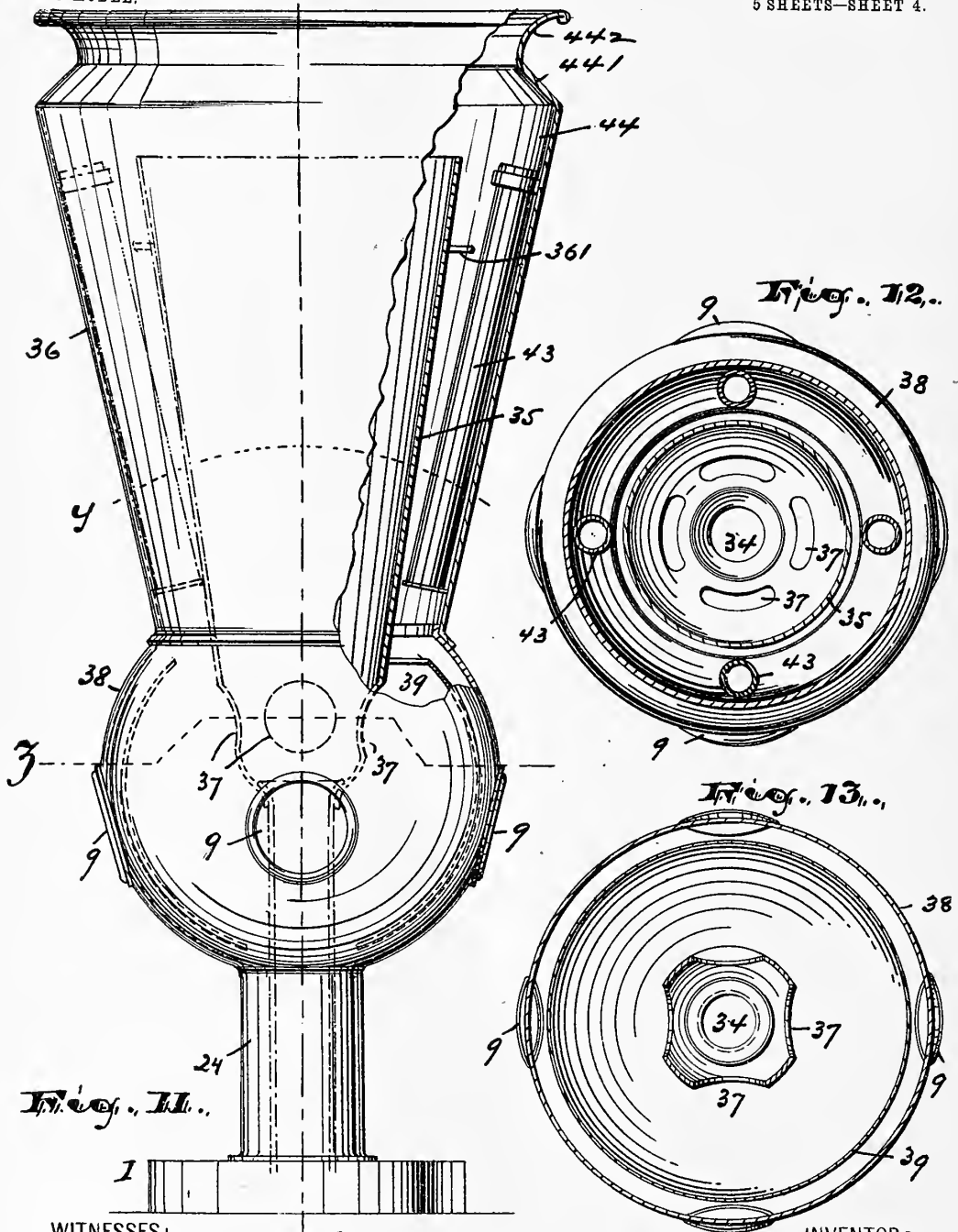


Fig. 11.

Fig. 12.

Fig. 13.

WITNESSES:

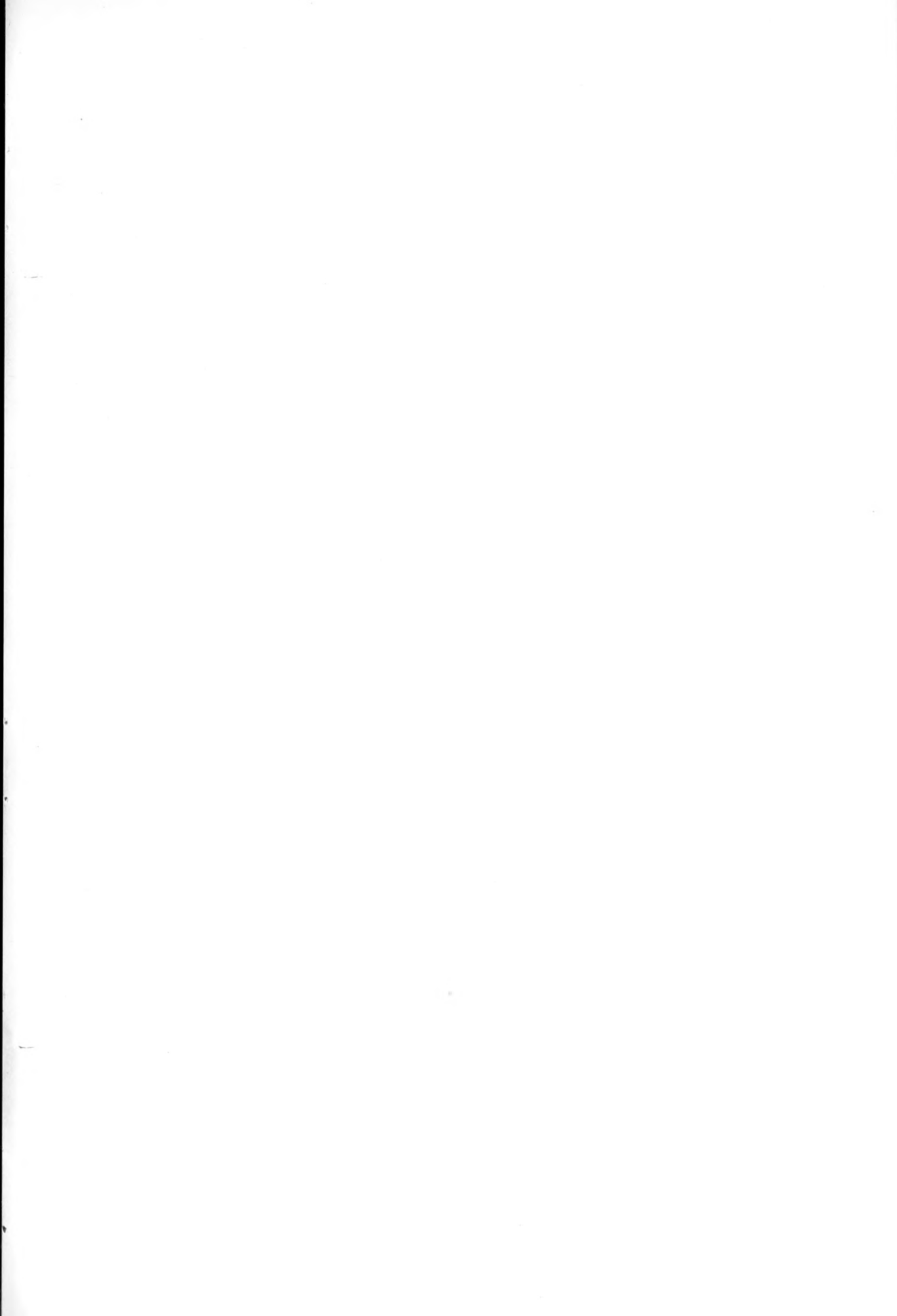
Hwy King
Russell M. Everett

y²

Nathan L. Lewis,

INVENTOR =

BY
Drake & Co.
 ATTORNEYS.

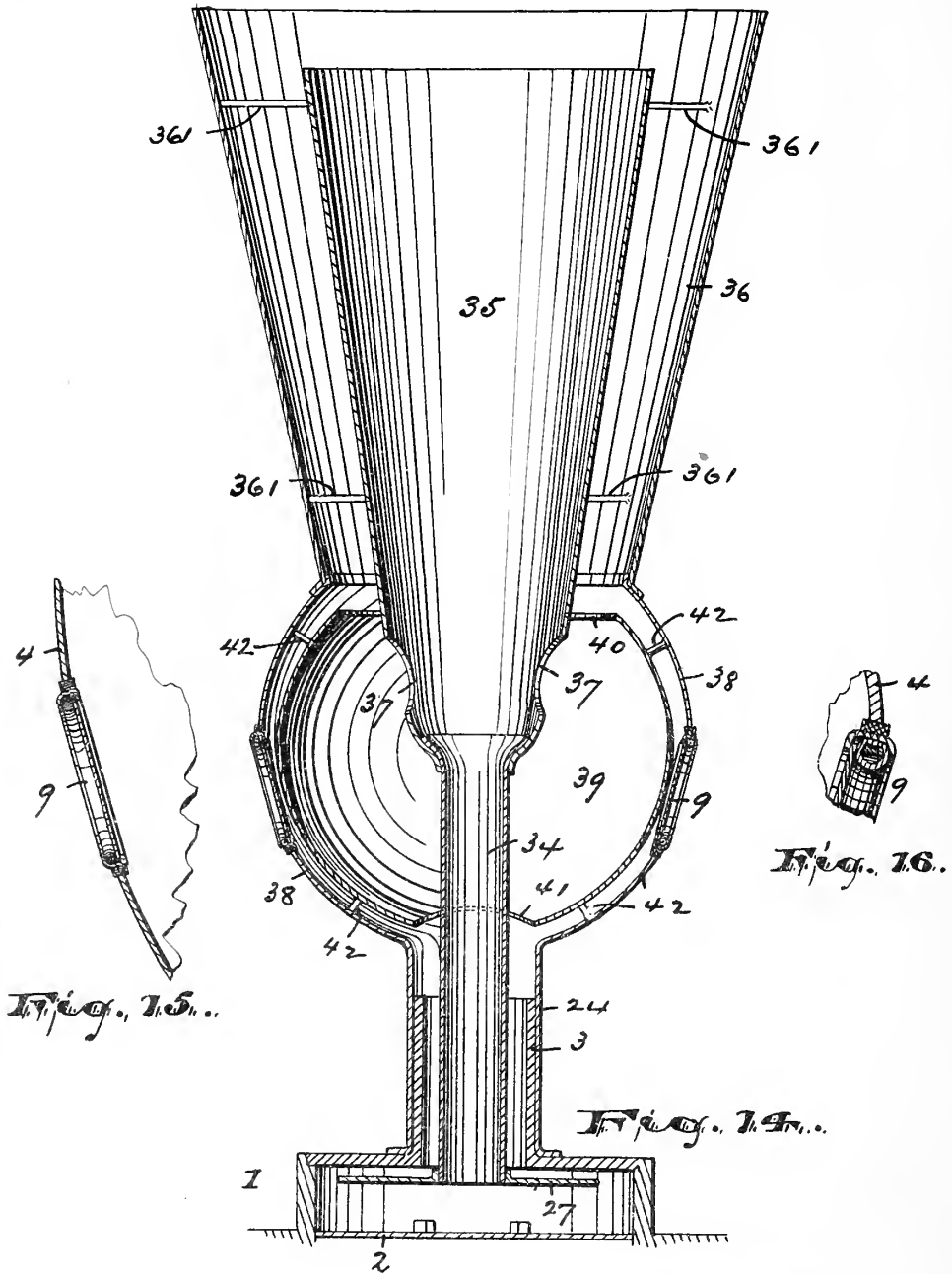


N. L. LEWIS.
TALKING MACHINE.

APPLICATION FILED FEB. 28, 1903.

NO MODEL.

5 SHEETS—SHEET 5.



WITNESSES:
Henry King
Russell M. Everett

INVENTOR:
Nathan L. Lewis,

BY
Drake & Co.
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

NATHAN L. LEWIS, OF NEW YORK, N. Y.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 774,482, dated November 8, 1904.

Application filed February 28, 1903. Serial No. 145,554. (No model.)

To all whom it may concern:

Be it known that I, NATHAN L. LEWIS, a citizen of the United States, residing at New York city, in the borough of Manhattan and State of New York, have invented and produced new and original Improvements in Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

The objects of this invention are to provide an amplifying and conducting device which can be employed in connection with the horns of talking-machines for improving the sound both in tone and volume, to thus secure a distinct and accurate reproduction from the talking-machine or to enable the perfect record to be made; to provide a construction which can be fitted to any machine between the usual speaker and the horn, receiving at opposite points the said parts, to thus improve the efficiency of the talking-machine, and to obtain other advantages and results, some of which may be hereinafter referred to in connection with the description of the working parts.

The invention consists in the improved amplifying and conducting device for talking-machines and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like figures of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of my improved device in its preferred form; and Figs. 2 and 3 are cross-sectional views upon line *u*, Fig. 1, looking toward the opposite ends of the device, respectively. Fig. 4 is a longitudinal central section of the device as on line *u'*, Fig. 1. Fig. 5 is a side elevation of a certain sleeve detached, and Fig. 6 is a plan of the same. Fig. 7 is a side elevation of a modified form of my improved device combined with a horn, and Fig. 8 is a central longitudinal section of

the same. Fig. 9 is a side elevation of a certain interior tube, and Fig. 10 is a plan of the same. Fig. 11 shows a modified combination of my device with a horn; and Figs. 12 and 13 are cross-sectional views of the same upon lines *y* and *z*, respectively. Fig. 14 is a longitudinal central section upon line *y'*, Fig. 11; and Figs. 15 and 16 are enlarged portions of said section, showing more clearly the manner of mounting certain diaphragms.

In said drawings, 1 indicates the usual sound-box or speaker of a talking-machine having the flexible diaphragm 2 and at the top a cylindrical neck 3. To said neck is applied my improved device, which consists of a substantially spherical body portion 4, having at opposite points tubular extensions or necks 5 6, one of which, as 5, is adapted to receive the neck of the sound-box, and the other, 6, to receive a horn 7, preferably by screwing, as shown in Figs. 1 and 4 more particularly. The said spherical body portion 4 is formed, preferably, of sheet metal, and at the lower part of its walls or next the neck 5 are doors 8, permitting access to the interior. Around the great circle of said sphere formed by a plane perpendicular to the line joining the two necks 5 6 is a series of diaphragms 9, formed of very thin sheet metal, mica, or some other material more flexible than the walls of the body portion. There is also between said series of diaphragms 9 and the horn-receiving neck 6 of the device another circular series of similar diaphragms 10.

That part of the interior chamber of the body portion 4 which is adjacent to the sound-box-receiving neck is occupied by concentric hemispherical diaphragms, as 11 12, supported from the walls of the body portion by stays 13, the edges of the inner diaphragm, as 12, being preferably left free, as shown, while the outer one has its edges connected by stays 14 to the centers of the diaphragms 9. In the opposite end portion of the spherical body part 4 is preferably arranged a small hemispherical diaphragm 15, having at its base a plane circular diaphragm 16, terminating at its edges short of the walls of the body. Protuberances 17 may be formed in the walls

of the body portion 4 adjacent to the constricted parts of its interior passage to further improve the sound, if desired.

Diametrically throughout the body portion 4 extends a tube 18, which is disposed centrally and longitudinally of the necks 5 6, as shown, terminating at its extremities substantially flush therewith. This tube is preferably jointed within the sound-box-receiving neck, as at 19, for greater convenience. Furthermore, the said tube is flared at its ends 20 adjacent to the diaphragm 2 of the sound-box 1 and adapted to receive from said diaphragm a certain portion of the sound-waves and conduct the same directly through the device to the horn 7 without adding to or subtracting from them. Other sound-waves enter the body portion 4 of the device through the passage around said tube 18 and are by the diaphragms above described amplified and conducted into the horn 7 through the neck 6. The said diametrically-disposed tube 18 passes through the centers of the various diaphragms described, and the two diaphragms 15 16 are shown supported thereby, although they might, if preferred, be supported by stays, as the others are shown.

In practice my improved device may sometimes be permanently connected to the neck of a horn, as shown in Figs. 7, 8, 11, and 14, thus exhibiting only one neck—viz., the one, 24—for connection to the talking-machine. Tubular branches 21 may be provided upon the throat of the horn for attachment of tubes 35 or other horns.

In Figs. 7 to 10, inclusive, 22 indicates the body portion of the device, and 23 a horn combined therewith. The central tube 25 is in this construction shown supported by arms 26 from the walls of the body portion and has at its sound-box end an annular lateral flange 27 and adjacent to the neck of the horn 23 a peripheral enlargement 28. The interior diaphragms of my device in this construction are shown consisting of two hemispherical diaphragms 29 30, slightly separated at their edges and connected by stay-rods 31 or other suitable means to the series of diaphragms 9 set in the walls of the body portion. Where said hemispherical diaphragms 29 30 surround the tube 25 they are apertured, as at 32, and within the said two diaphragms 29 30 are parallel circular diaphragms 33 34 on opposite sides of the central tube 25 and extending across the plane of division of the hemispherical diaphragms. Under some conditions the central tube in this construction may be made star-shaped in cross-section, as shown in Figs. 9 and 10, and in this case the supporting or stay rods 26 may be dispensed with, and the angular projections 261 at the sides of the tube engage directly the necks of the device to hold said tube in alinement.

In Figs. 11 to 14, inclusive, I have shown

further modification of my idea, consisting in the central tube 34 being flared at its outer end 35 parallel with the horn 36 and having said flared end either permanently or removably supported from the inner walls of the horn, as by stays 361 or any suitable form of collar or the like. The throat of the flared portion may be apertured, as at 37, if desired. In this construction the body portion 48 of my device is shown as containing a single substantially globular diaphragm 39, truncated at opposite points to form apertures 40 41 to receive the central tube 34. The said diaphragm 39 is supported at points near said apertures by stays 42, extending to the inner walls of the body portion. In Fig. 11, moreover, tubes 43 are shown laid on the inner surface of the horn 36 and extending longitudinally thereof to a point close to the spherical body portion 48 of the amplifying device. Furthermore, in Fig. 11 I have shown the horn 44 provided at its mouth with a contracted outlet instead of the usual straight lip and flaring horn commonly used. This construction is obtained by applying to the end of the horn a converging flange 441, beyond which a lip 442 projects. The effect of this is to concentrate and improve the tone of the sound production.

By my improved device the sound-waves are in their passage through and impact against the various diaphragms described reinforced or amplified, so that the sound production of the machine loses its metallic effect and is made natural and strong.

In connection with the use of my improved device I may secure increased tension of the sound-box diaphragm by winding upon the neck of the same a coil 45, of wire, connected at its ends 46 47 to a battery 48, whereby the neck of the sound-box serves as an electromagnet, said neck being preferably extended, as at 49, and the diaphragm having fixed to it magnetic blocks 50 to be attracted by said magnet. In this construction a sleeve or casing 51 is slipped over the wires 45 upon the neck of the sound-box, so that the latter will not become disarranged, the neck of the amplifying device then receiving said sleeve 51. If preferred, arms 52 may extend inward from the top of the sleeve 51 through the walls of the central tube of the trumpet and form a tripod, from which a spiral spring 53 may depend through the said central tube and be fastened at its lower end to the center of the sound-box diaphragm. This will enable added tension to be given the sound-box diaphragm besides the magnetic means, or by placing a switch 54 in the circuit of said magnet either device can be used independent of the other for reproduction of sound.

Although I have shown and described my invention as applied to the sound reproduction of talking-machines, it will nevertheless be understood that it is equally applicable for the

recording of sound. In this case, however, a portion of the tubes and diaphragms may be dispensed with and the body portion of the device used directly in conjunction with the magnetic tension means described for securing telephonic action of the recording-diaphragm. Furthermore, although I have shown and described my device as spherical in shape, or substantially so, it will be understood that other shapes may be employed, the diaphragm being made to conform thereto.

Various modifications and changes of detail construction other than those specifically set forth may be employed without departing from the spirit and scope of the invention, and I do not wish to be understood as limiting myself by the positive descriptive terms employed except as the state of the art may require.

Having thus described the invention, what I claim as new is—

1. A phonograph horn or trumpet having an enlarged and subdivided amplifying and conducting chamber secured to the throat or neck piece thereof for improving the sound-transmission, said chamber having double walls separated by an air-space and being itself subdivided.

2. The combination with a horn for talking-machines, having a conoidal bore, of an enlarged amplifying and conducting chamber located at the throat of said horn, said chamber having separated double walls and being subdivided interiorly, and reinforcing-diaphragms in said chamber.

3. An amplifying and conducting device for talking-machines, providing an interior chamber and having at opposite sides means for connection to a speaker and horn, and reinforcing-diaphragms in said chamber presenting a central passage in alinement with said connecting means.

4. An amplifying and conducting device for the reproduction of sound, providing an interior chamber and having at opposite sides means for connection to a horn and speaker, respectively, and reinforcing-diaphragms secured to the walls of said chamber and lying within the same.

5. The combination with a phonograph horn or trumpet, of an amplifying sound-box secured to the throat or neck of the horn, diaphragms secured at separate points to the inner surface of the said amplifying-box and forming therewith double walls, and a sound-conducting tube passing through said box.

6. The combination with a phonograph horn or trumpet, of an amplifying sound-box adapted to be secured to the throat or neck of said horn, diaphragms mounted in the walls of said box, other diaphragms concaved and forming with the box double walls and a sound-conducting tube extending through the said box.

7. The combination with a conoidal horn or trumpet for talking-machines, of an enlarged

amplifying sound-box at the throat of said horn, reinforcing-diaphragms in said sound-box, and a central tube extending through the sound-box and having a flaring end projecting into the said conoidal horn.

8. An amplifying device for talking-machines, comprising a spherical body portion provided at opposite sides with means for connection to a sound-box and horn respectively, and segmental spherical diaphragms mounted in said body portion and having parts of themselves free to vibrate.

9. An amplifying device for talking-machines, comprising a spherical body portion provided at opposite sides with connection means for a sound-box and horn, respectively, circular resilient diaphragms mounted in the outer walls of said body portion, and segmental spherical diaphragms inside said body portion and partially supported by stay-rods extending to the centers of said first-mentioned diaphragm.

10. In an amplifying device for talking-machines, the combination of a spherical body portion having at opposite sides means for connection to a sound-box and horn, respectively, a tubular passage extending centrally through said body portion between said means for connection, and diaphragms arranged in said body portion around the said tube.

11. In an amplifying device for talking-machines, the combination with a spherical body portion having at one side a neck to receive a sound-box and being at the opposite side joined to a conoidal horn, a tube extending centrally through said body portion and its neck and flaring at the opposite end into said conoidal horn and segmental spherical diaphragms mounted in said body portion around the said central tube.

12. In an amplifying device for talking-machines, the combination with a spherical body portion having at one side a neck to receive a sound-box and being at the opposite side joined to a conoidal horn, a tube extending centrally through said body portion and its neck and projecting into said horn, of diaphragms mounted in said body portion around said tube and being free at portions of their area to vibrate.

13. The combination with a sound-box for talking-machines, having a diaphragm mounted therein and an exterior neck, of a wire coiled around said neck and being in circuit with a battery or source of electric energy, whereby said neck becomes an electromagnet, and magnetic pieces fastened to said diaphragm and adapted to be attracted by said electromagnet.

14. The combination with a sound-box having a neck 3, and a vibratory diaphragm, of a sleeve 51, slipped over said neck, arms 52, projecting inward from the edges of said sleeve to a common point and a spiral spring extending from the point of meeting of said

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arm and being attached to the diaphragm, said spring being under tension.

15 15. The combination with a sound-box having a neck and a vibratory diaphragm, of a sleeve 51, slipped over the neck, supporting means arranged in said sleeve, and a spiral spring extending from said supporting means to the said diaphragm.

10 16. A phonograph horn or trumpet comprising a conical body portion having at its mouth an inwardly-converging annular flange.

17. A phonograph horn or trumpet, having

a wide mouth at one end and a neck-piece or throat at the other end, and neck-pieces or tubes projecting from the conoidal body of the horn. 15

In testimony that I claim the foregoing I have hereunto set my hand this 6th day of February, 1903.

NATHAN L. LEWIS.

Witnesses:

RUSSELL M. EVERETT,
CHARLES H. PELL.



E. L. AIKEN.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED JUNE 28, 1904.

NO MODEL.

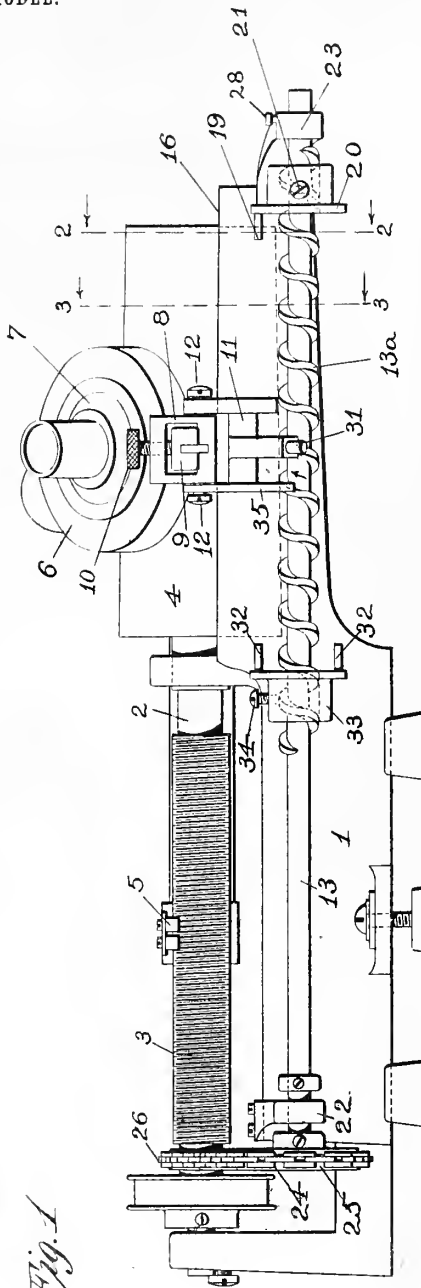


Fig. 1

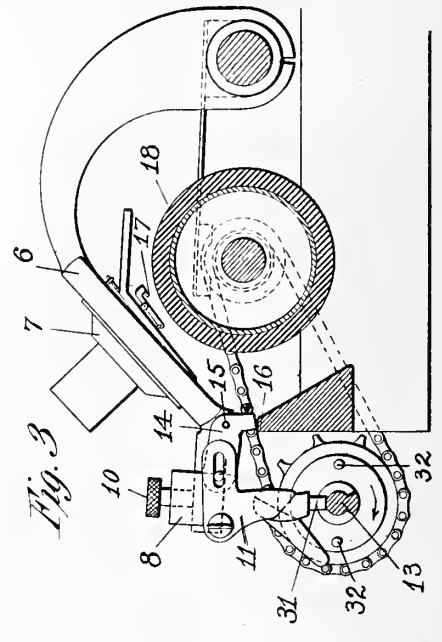


Fig. 3

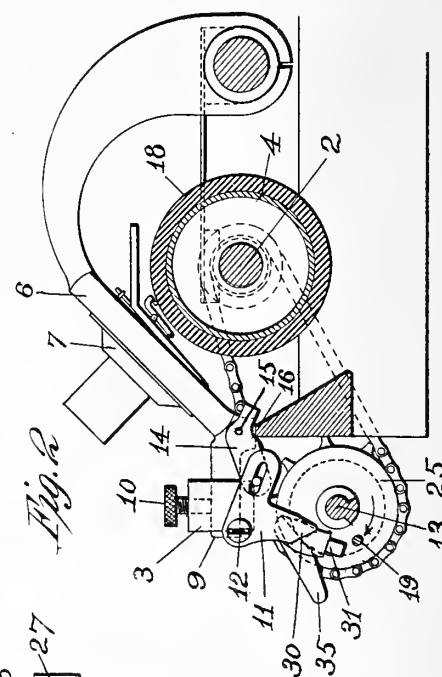


Fig. 2

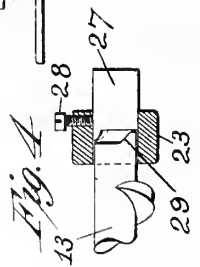


Fig. 4

Witnesses:
Jas. F. Coleman
Delos Holden.

Inventor
Edward L. Aiken
 By *Frank L. Aiken*
 his Attorney.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 775,591, dated November 22, 1904.

Application filed June 28, 1904. Serial No. 214,465. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States, residing at East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Repeating Attachments for Phonographs, of which the following is a description.

My invention has for its object the provision of means for raising the diaphragm-carrier of a phonograph or other talking-machine at any desired point in its forward movement and returning it to its starting position at the beginning of the record or to any other desired starting position. It has for its object also to provide a device of this character which shall consist of few parts, which may be readily applied to phonographs of standard types, which can be operated with little power, which can be readily adjusted, which will be positive and certain in its action, which will not become deranged, and which will permit the diaphragm-carrier to be raised to the fullest extent, so as to leave the mandrel completely exposed to receive a record-cylinder or permit one to be removed therefrom.

My invention consists in the features hereinafter described and claimed.

In the drawings which accompany this specification, Figure 1 is a front elevation showing my invention as applied to a phonograph. Fig. 2 is a section on the line 2 2 of Fig. 1, showing the diaphragm-carrier lowered and in proper position for reproducing, the pins which are used for tripping the device to lower the carrier being removed for the sake of clearness. Fig. 3 is a section on the line 3 3 of Fig. 1, showing the diaphragm-carrier elevated and in proper position for its return movement. Fig. 4 is a sectional detail view of one end of the return-screw shaft and bearing.

In the several views corresponding parts are indicated by the same reference-numerals.

The drawings illustrate one embodiment of my invention applied to a phonograph of ordinary construction, the latter including a frame 1, main shaft 2, feed-screw 3, mandrel

4, feed-nut 5, diaphragm-carrier 6, and reproducer 7 of the usual construction. My attachment, as shown, comprises a sleeve 8, removably secured to the projecting arm 9 of the diaphragm-carrier 6 by means of a set-screw 10. A dog 11 is pivoted to the sleeve 8 by pivots 12, whose axis is parallel to the return-screw shaft 13. This dog is connected to a lift-lever 14 by a pin-and-slot connection, as shown in Figs. 2 and 3, whereby a movement of the dog upon its pivot 12 causes the lift-lever to move upon its pivot 15. The lift-lever by cooperating with the straight edge 16 raises the diaphragm-carrier and holds it in an elevated position while it is being returned to its starting-point, thereby holding the feed-nut out of engagement with the feed-screw and the reproducing-stylus 17 out of engagement with the record 18.

The means for turning the lifting-dog 11, and thereby lifting the diaphragm-carrier, consists of a pin 19, carried by a disk 20. This disk rotates continuously during the operation of the phonograph, being preferably sleeved upon the return-screw shaft 13 and secured thereto in any suitable manner, as by a set-screw 21. It is obvious, however, that the said disk may be sleeved upon and driven by an auxiliary shaft, if desired.

The return-screw shaft 13 is journaled in bearings 22 and 23, secured to the frame 1 in any suitable manner and is driven from the shaft 2 in any suitable manner, as by the chain 24, passing over the sprockets 25 and 26. In the bearing 23 (see Fig. 4) is secured a stationary cam 27, held by a set-screw 28. The end of the screw-shaft 13 is provided with a cam 29, which cooperates with the cam 27 in a manner to be now explained.

The forward movement of the diaphragm-carrier along the record causes the dog 11 to approach the rotating pin 19 until it comes in contact therewith, at which time the pin tends to turn or raise the dog and at the same time tends to push it and the carrier in a backward direction—that is, the pin does not exert a direct lift on account of the shapes and rela-

tive positions of the various parts. The forward movement of the carrier is so slow that this engagement of the pin with the dog is very slight, and in the absence of the cams 27 and 29 the pin would raise the diaphragm-carrier until the feed-nut was disengaged from the feed-screw, whereupon the carrier would slide back and fall, to be picked up on the next revolution of the pin with the same result, and so on. To obviate this difficulty, I provide means whereby the shaft 13 and pin 19 may yield longitudinally and allow the carrier to advance until the dog 11 will be engaged by the pin 19 with sufficient bearing-surface to raise it from the position shown in Fig. 2 to that of Fig. 3. The cam 27 is set in such a position that the shaft 13 and pin 19 will be thrown farthest toward the left shortly before the pin reaches the shoulder 30 of the dog 11, and the cams will not prevent the shaft from being moved longitudinally by the dog. The pin 19 will by reason of the cams 27 and 29 be carried once in each revolution to a fixed position with respect to the frame of the machine. Whenever the pin passes the dog without turning it, the dog will be carried farther to the right by the feed-screw until the dog reaches a position where the throw of the cams 27 and 29 will cause the pin to be carried against it with sufficient bearing-surface to raise the diaphragm-carrier from the position of Fig. 2 to that of Fig. 3. In practice I have found that when the weight of the diaphragm-carrier is slight—that is, when it is not carrying a horn—the pin 19 will strike against the dog 11 once or twice before it engages it sufficiently to raise the carrier, and when the carrier is weighted with the horn the pin will strike against the dog about three times, at the end of which time the carrier has traveled far enough to the right to insure a good grip of the pin upon the shoulder 30 at the succeeding revolution.

When the dog is raised into the position shown in Fig. 3, a depending pin 31, carried by the dog, is brought into engagement with the screw-shaft 13, preferably the upper surface thereof. The screw 13^a, being of coarse pitch, rapidly returns the diaphragm-carrier to its starting position. When this is reached, the carrier is lowered by means of a rotating pin or preferably by one of a pair of rotating pins 32 32, which may be driven continuously by the screw-shaft 13, as shown, or by an auxiliary shaft. The sleeve 33, which carries the said pins, is longitudinally adjustable upon the shaft 13 and may be secured thereto by a set-screw 34. The dog 11 carries a depending trip-arm 35, and as the carrier moves rearward the said trip-arm is carried into the path of the pins 32, one of which strikes the said arm and turns the dog from the position of Fig. 3 to that of Fig. 2, thereby disengaging the pin 31 from the screw 13^a, turn-

ing the lift-lever 14 and lowering the diaphragm-carrier so that the feed-nut will be in engagement with the feed-screw and the reproducer-stylus 17 will be in its operative position upon the record, and the operation may proceed as before.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a repeating attachment for talking-machines, in combination, a traveling diaphragm-carrier, a straight edge supporting the forward end of said carrier, a lift-lever pivoted to said carrier and cooperating with the straight edge to raise the carrier, a dog pivoted to the carrier and a connection between said dog and lift-lever whereby a pivotal movement of the dog turns said lift-lever and raises the carrier, substantially as set forth.

2. In a repeating attachment for talking-machines, in combination, a traveling diaphragm-carrier, a straight edge supporting the forward end of said carrier, the lift-lever pivoted to said carrier and cooperating with the straight edge to raise the carrier, a return-screw, a dog pivoted to the carrier, having a portion adjacent said screw and adapted to engage the same, and a connection between said dog and lift-lever whereby a pivotal movement of the dog turns the lift-lever and raises the carrier, and finally causes the dog to engage the return-screw, substantially as set forth.

3. In a repeating attachment for talking-machines, in combination, a traveling diaphragm-carrier, a straight edge supporting the forward end of said carrier, a lift-lever pivoted to said carrier and cooperating with the straight edge to raise the carrier, a return-screw, a dog pivoted to the carrier, having a portion adjacent said screw and adapted to engage the same, and a connection between said dog and lift-lever, the parts being so arranged that a pivotal movement of the dog turns the lift-lever and raises the carrier and dog, and finally causes the dog to rest upon and engage the top surface of the return-screw, substantially as set forth.

4. In a repeating attachment for talking-machines, in combination, with the feed-screw, feed-nut and diaphragm-carrier, mechanism for raising the diaphragm-carrier which comprises a rotating shaft, a pin or projection carried thereby, and means whereby the rotation of said shaft causes simultaneous reciprocating and rotary movement of the said pin or projection, substantially as set forth.

5. In a repeating attachment for talking-machines, in combination with the feed-screw, feed-nut and diaphragm-carrier, mechanism for raising the diaphragm-carrier which comprises a rotating shaft, a pin or projection carried thereby, and a cam carried by said shaft whereby the rotation of said shaft causes simultaneous reciprocating and rotary move-

ment of the said shaft and pin, or projection, substantially as set forth.

6. In a repeating attachment for talking-machines, in combination with the feed-screw, feed-nut and diaphragm-carrier, mechanism for raising the diaphragm-carrier, which comprises a rotating shaft, a pin or projection carried thereby and longitudinally adjustable thereon, and means whereby the rotation of said shaft causes simultaneous reciprocating and rotary movement of the said pin or projection, substantially as set forth.

7. In a repeating attachment for talking-machines, in combination, a traveling diaphragm-carrier, a straight edge supporting the forward end of said carrier, a lift-lever pivoted to said carrier and cooperating with the straight edge to raise the carrier, a dog pivoted to the carrier and a connection between said dog and lift-lever whereby a pivotal movement of the dog turns said lift-lever and raises the carrier, and a trip mechanism for restoring said dog

to its original position and thereby lowering said carrier, substantially as set forth.

8. In a repeating attachment for talking-machines, in combination, a traveling diaphragm-carrier, a straight edge supporting the forward end of said carrier, a lift-lever pivoted to said carrier and cooperating with the straight edge to raise the carrier, a dog pivoted to the carrier and a connection between said dog and lift-lever whereby a pivotal movement of the dog turns said lift-lever and raises the carrier, and adjustable trip mechanism for restoring said dog to its original position and thereby lowering said carrier, substantially as set forth.

This specification signed and witnessed this 27th day of June, 1904.

EDWARD L. AIKEN.

Witnesses:

FRANK L. DYER,
DELOS HOLDEN.



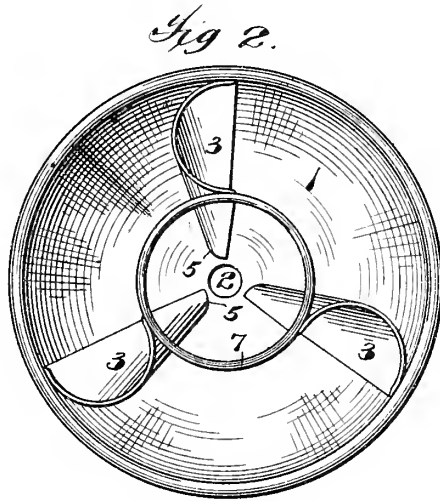
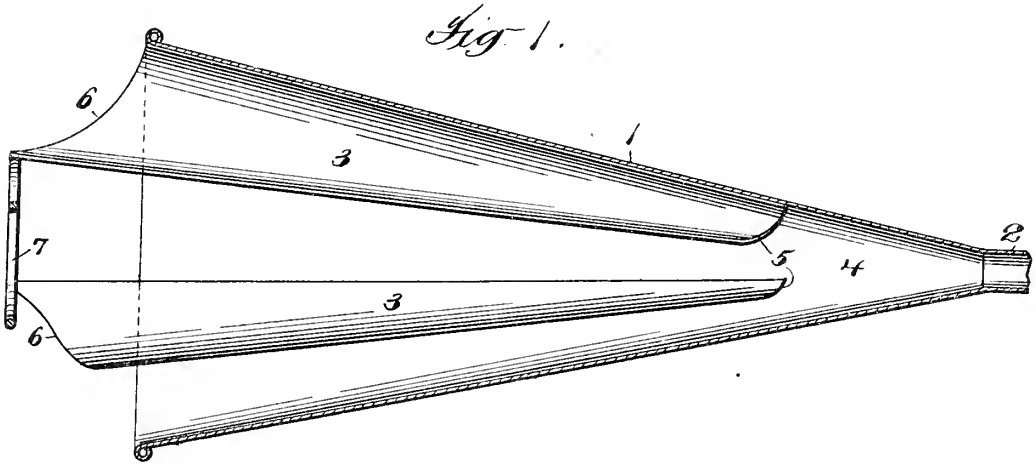
No. 776,070.

PATENTED NOV. 29, 1904.

F. S. KINNEY.
HORN FOR SOUND REPRODUCING INSTRUMENTS.

APPLICATION FILED APR. 9, 1904.

NO MODEL.



Witnesses
A. Kehoe
G. Galison.

Inventor
Francis S. Kinney
By his Attorneys
Phillip Sampson Rice Kennerly

UNITED STATES PATENT OFFICE.

FRANCIS S. KINNEY, OF BUTLER, NEW JERSEY.

HORN FOR SOUND-REPRODUCING INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 776,070, dated November 29, 1904.

Application filed April 9, 1904. Serial No. 202,321. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS S. KINNEY, a citizen of the United States, residing at Butler, county of Morris, and State of New Jersey, have invented certain new and useful Improvements in Horns for Sound-Reproducing Instruments, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in horns for sound-reproducing instruments, such as phonographs or graphophones, and has for its object to produce a simple and efficient horn by which the sound-waves are collected and carried to the recorder.

With this and other objects not specifically referred to in view the invention consists in a certain construction hereinafter described and then specifically pointed out in the claims hereunto appended.

Referring to the accompanying drawings, Figure 1 is a longitudinal section of the horn embodying the invention, and Fig. 2 is an end view.

Referring to the drawings, the improved horn is, as is usual, of funnel shape, the body of the horn being marked 1. The horn is provided with the usual junction-section 2, by which it is secured to the reproducer. The horn is provided with a plurality of vanes 3, these vanes being at their outer edges in contact with the body of the horn and being preferably secured thereto. These vanes taper from the outer end of the horn inwardly, but stop some distance short of the inner end of the horn, so as to leave a sound-receiving chamber 4 at that end of the horn.

In the preferred construction the inner ends of the vanes will be rounded, as indicated at 15, and they will be concavo-convex, as shown. The inner edges of the vanes will be disconnected from each other, so as to leave a central unobstructed passage therethrough. In the preferred construction, furthermore, the outer edges of the vanes will terminate flush with the mouth of the horn, but the inner edges will be carried out beyond the mouth of the horn. The outer ends of the vanes will preferably be inwardly curved or concave, as indicated at 6.

While the vanes might be supported simply by being connected to the body of the horn in any suitable manner, in the preferred construction they will be further supported by a sustaining device—such, for instance, as a ring 7—to which the outer ends of the inner edges of the vanes are connected.

Experiment has shown that with a horn having the vanes before described greatly improved records are produced. While the proportions of the several parts may be varied, the best results have been attained where the proportions were substantially those illustrated in the drawings. The number of vanes may of course be varied; but the best results are obtained by horns provided with three vanes.

What is claimed is—

1. A horn of funnel shape for sound-reproducing machines, said horn having a plurality of inwardly-tapering vanes located therein, the vanes terminating short of the inner end of the funnel so as to leave a chamber at that end, the outer edges of the vanes being connected to the body of the horn and the inner edges being disconnected from each other, substantially as described.

2. A horn of funnel shape for sound-reproducing machines, said horn having a plurality of concavo-convex inwardly-tapering vanes located therein, the vanes terminating short of the inner end of the funnel so as to leave a chamber at that end, the outer edges of the vanes being connected to the body of the horn and the inner edges being disconnected from each other, substantially as described.

3. A horn of funnel shape for sound-reproducing machines, said horn having a plurality of inwardly-tapering vanes located therein, the vanes terminating short of the inner end of the funnel so as to leave a chamber at that end, the outer edges of the vanes being connected to the body of the horn and terminating substantially flush with its mouth and the inner edges extending beyond the mouth of the horn and being disconnected from each other and the outer end of each vane being concave, substantially as described.

4. A horn of funnel shape for sound-reproducing machines, said horn having a plurality

of concavo-convex inwardly-tapering vanes located therein, the vanes terminating short of the inner end of the funnel so as to leave a chamber at that end, the outer edges of the
 5 vanes being connected to the body of the horn and terminating substantially flush with its mouth and the inner edges extending beyond the mouth of the horn and being disconnected
 10 from each other and the outer end of each vane being concave, substantially as described.

5. A horn of funnel shape for sound-reproducing machines, said horn having a plurality of inwardly-tapering vanes located therein, the inner ends of the vanes being rounded and
 15 terminating short of the inner end of the funnel so as to leave a chamber at that end, the outer edges of the vanes being in contact with the body of the horn and the inner edges being separated from each other, substantially
 20 as described.

6. A horn of funnel shape for sound-reproducing machines, said horn having a plurality of concavo-convex inwardly-tapering vanes located therein, the inner ends of the vanes
 25 being rounded and terminating short of the inner end of the funnel so as to leave a cham-

ber at that end, the outer edges of the vanes being in contact with the body of the horn and the inner edges being separated from each other, substantially as described. 30

7. A horn of funnel shape for sound-reproducing machines, said horn having a plurality of inwardly-tapering concavo-convex vanes located therein, the concave face of each vane facing the convex face of an adjacent vane, the vanes having rounded ends and terminating
 35 short of the inner end of the funnel so as to leave a chamber at that end, the outer edges of the vanes being in contact with the body of the horn and terminating substantially flush
 40 with its mouth and the inner edges being separated from each other and extending beyond the mouth of the horn, the outer ends of the vanes being concave, substantially as described. 45

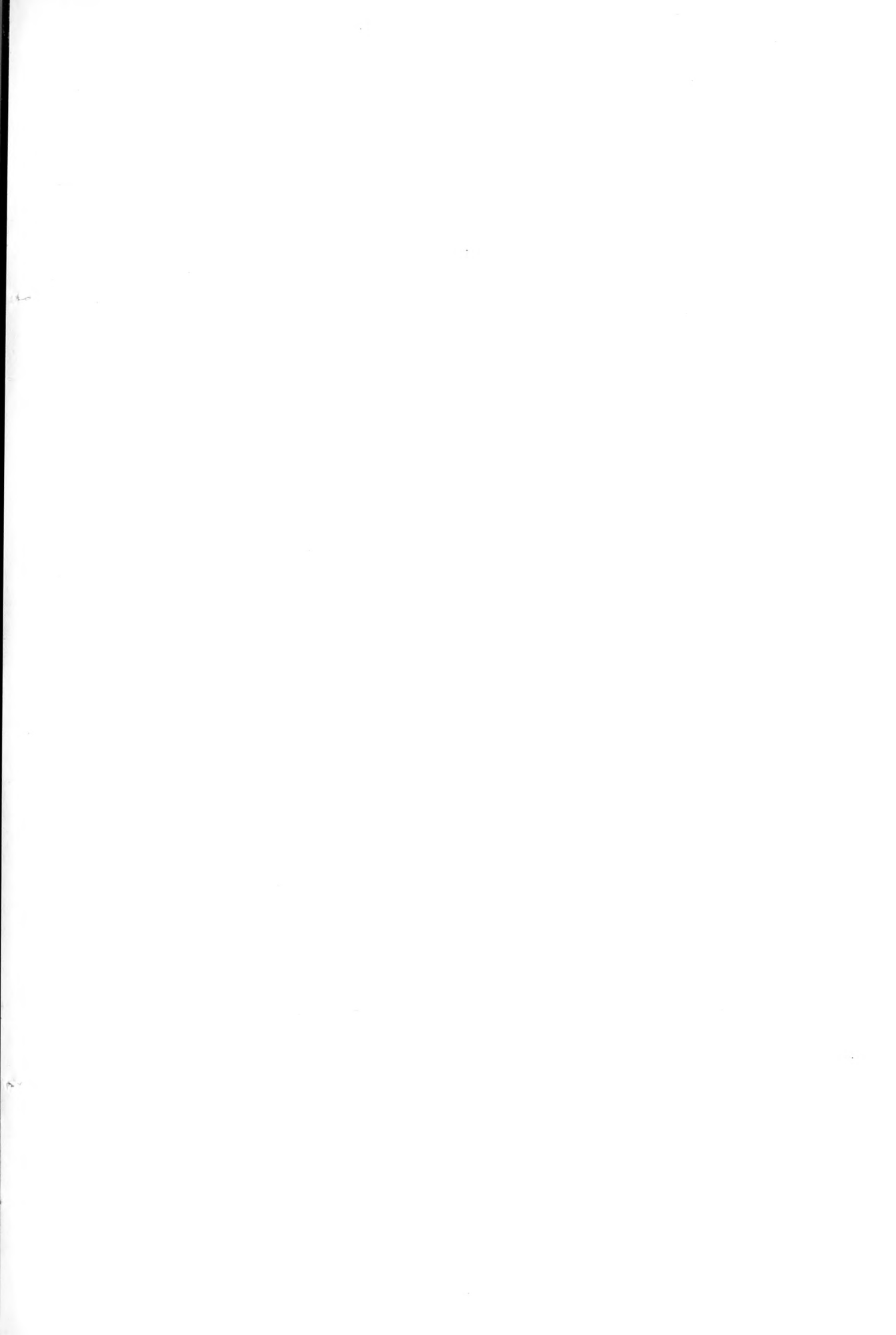
In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANCIS S. KINNEY.

Witnesses:

J. A. GRAVES,

W. H. KENNEDY.

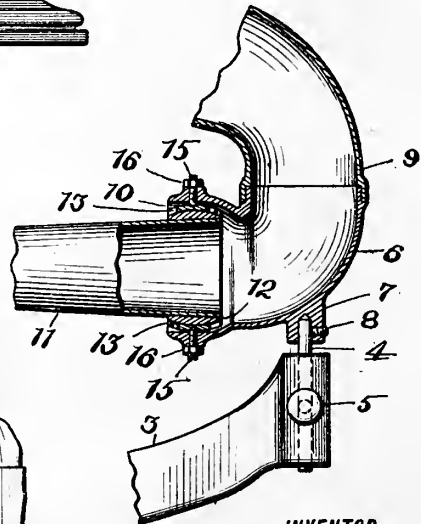
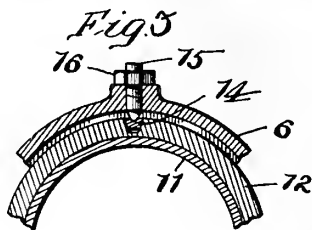
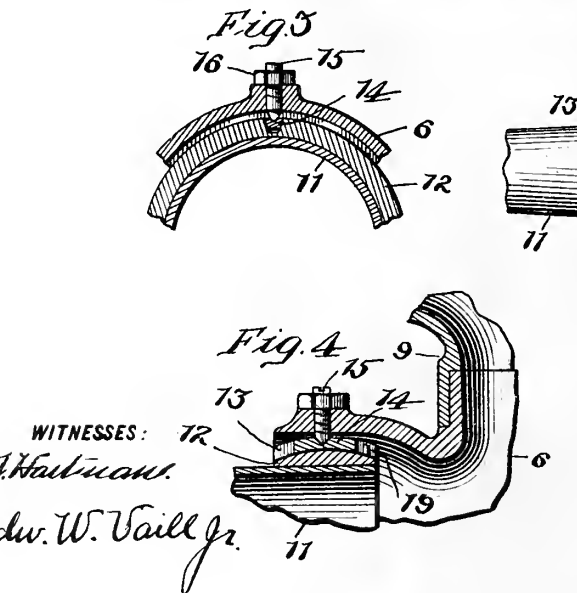
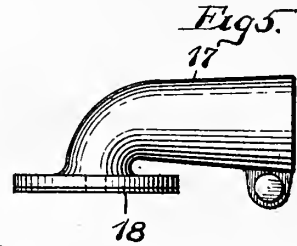
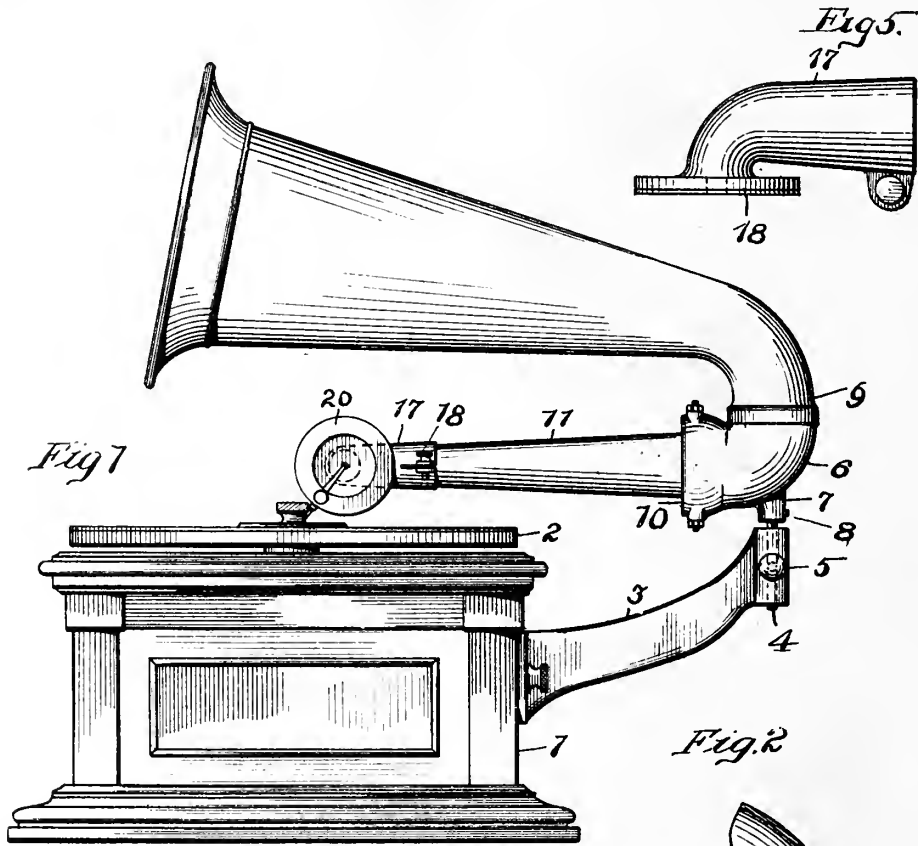


J. JETTER.

HOLLOW SOUND CONVEYING TUBE FOR TALKING MACHINES.

APPLICATION FILED APR. 28, 1904.

NO MODEL.



WITNESSES:
H. J. Hartman.
Edw. W. Vaill jr.

INVENTOR
Julius Jetter
 BY
Edw. W. Vaill jr.
 ATTORNEY.

UNITED STATES PATENT OFFICE.

JULIUS JETTER, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

HOLLOW SOUND-CONVEYING TUBE FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 776,183, dated November 29, 1904.

Application filed April 28, 1904. Serial No. 205,279. (No model.)

To all whom it may concern:

Be it known that I, JULIUS JETTER, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Hollow Sound-Conveying Tubes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of this form of my invention is to provide such a construction in hollow sound-conveying tubes for connecting the sound-box with the amplifying-horn of talking-machines that the interior of said tube is unobstructed by any projections, while at the same time said tube is supported or pivoted so that the same may be easily moved in different directions required in the use of a machine, and the structure or parts are greatly simplified and reduced in number.

Briefly, this form of my invention comprises a hollow sound-conveying tube or arm, which carries at one end thereof the usual sound-box and which is pivoted at its other end to a hollow fixed connection, said connection also being adapted to support the amplifying-horn.

For a full, clear, and detailed description of this form of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a side elevation of a talking-machine embodying this form of my invention. Figs. 2, 3, 4, and 5 are views illustrating details of construction, certain parts being shown in section.

Referring to the drawings, the numeral 1 indicates the usual casing, which contains the spring-motor or other driving mechanism, which is connected by a vertical spindle with the usual turn-table 2. Attached to the motor-casing is a laterally-extending arm or bracket 3, which has at its outer end a vertical opening or socket, which carries a cylindrical rod or post 4, said rod or post 4 being retained adjustably within said opening by means of a thumb-screw 5. Upon the upper end of said rod 4 I place an elbow connection 6, which is

in the form of a casting, having a lug or boss 7 at its lower portion, said lug or boss having a socket into which the post 4 is adapted to be retained, there being a driving fit between said parts. The set-screw 8 is also provided for holding the said post 4 within the boss 7.

The upper end of the elbow-piece 6 is adapted to telescope with the smaller end of the amplifying-horn proper, as indicated at 9. The horizontal end of the elbow-piece 6 has a somewhat enlarged cylindrical opening 10 therein, which is adapted to receive one end of the sound-conveying tube 11. Said sound-conveying tube 11 is provided at its end within said opening 10 with a flange 12, having a surface which is a part of a sphere. Said flange is also provided with two segmental transverse grooves, as indicated at 13, within which are placed segmental shoes or keys 14. At points corresponding to opposite ends of a vertical diameter of the opening 10 in the elbow 6 I provide pivot-screws 15, which pass through said elbow and the tapering ends of which engage recesses in the shoes or keys 14. Said screws are held in position by suitable set-nuts 16. Within each groove 13 I may prefer to place pins or stops 19, which limit the vertical downward movement of the tube 11, so that when the sound-box is not in operation upon the record the arm will not drop beyond a certain predetermined point.

The sound-box 20 may be attached with the outer end of the tube 11 in any suitable manner; but I have herein shown a split connection 17, which is in the form of an elbow and is attached to the sound-box by means of a vertical plate or disk 18.

By the construction above described it will be seen that I have provided an extremely simple and efficient joint by which the sound-conducting tube may be connected with the amplifying-horn, all the parts being made of cast or drawn pieces without requiring delicate machine-work, and therefore being very easily assembled and interchangeable. The passages forming communication between the sound-box and the amplifying-horn are unobstructed by any pins or bars, and all parts be-

ing gradually curved give no hindrance to the movement of the sound-waves as they pass through said passages. Moving parts which give a vertical and horizontal play to the arm are reduced to the smallest size, and therefore produce a minimum amount of friction.

Having thus described my invention, it will be evident that changes may be made in the form and arrangement of parts without departing from the spirit and scope of my invention; but,

What I claim, and desire to protect by Letters Patent of the United States, is—

1. In a talking-machine, the combination with a sound-conveying tube, a fixed connecting-elbow adapted to telescope therewith, vertical pivots carried by said elbow, and means carried by said tube for engaging said pivots, and for allowing a vertical movement of said tube.

2. In a talking-machine, the combination with a sound-conveying tube, a fixed elbow adapted to telescope therewith, vertical pivots carried by one end of said elbow, a flange located upon the end of said tube, and having transverse grooves therein, shoes carried in said grooves, and adapted to be engaged by said pivots.

3. In a talking-machine, the combination with a sound-conveying tube, a spherical flange carried at one end thereof having transverse grooves therein, slidable shoes located in said grooves, a fixed elbow, one end of which is

adapted to telescope with the flange portion of said tube, and vertical pivots carried by said elbow adapted to engage said shoes.

4. In a talking-machine, the combination with a sound-conveying tube, a fixed elbow, a support for said elbow comprising an arm having a vertical opening therein, a pin adjustably held in said opening, said pin being adapted to engage a socket in said elbow, and a pair of vertical pivots connecting said tube, and elbow including slidable means to give a vertical movement to said tube, said slidable means being engaged by said pivots.

5. In a talking-machine, the combination with a sound-conveying tube, a fixed connecting part adapted to telescope therewith, pivots carried by one of said parts, and shoes longitudinally slidable in relation to said parts, and which engage said pivots for allowing a vertical and horizontal movement of said tube.

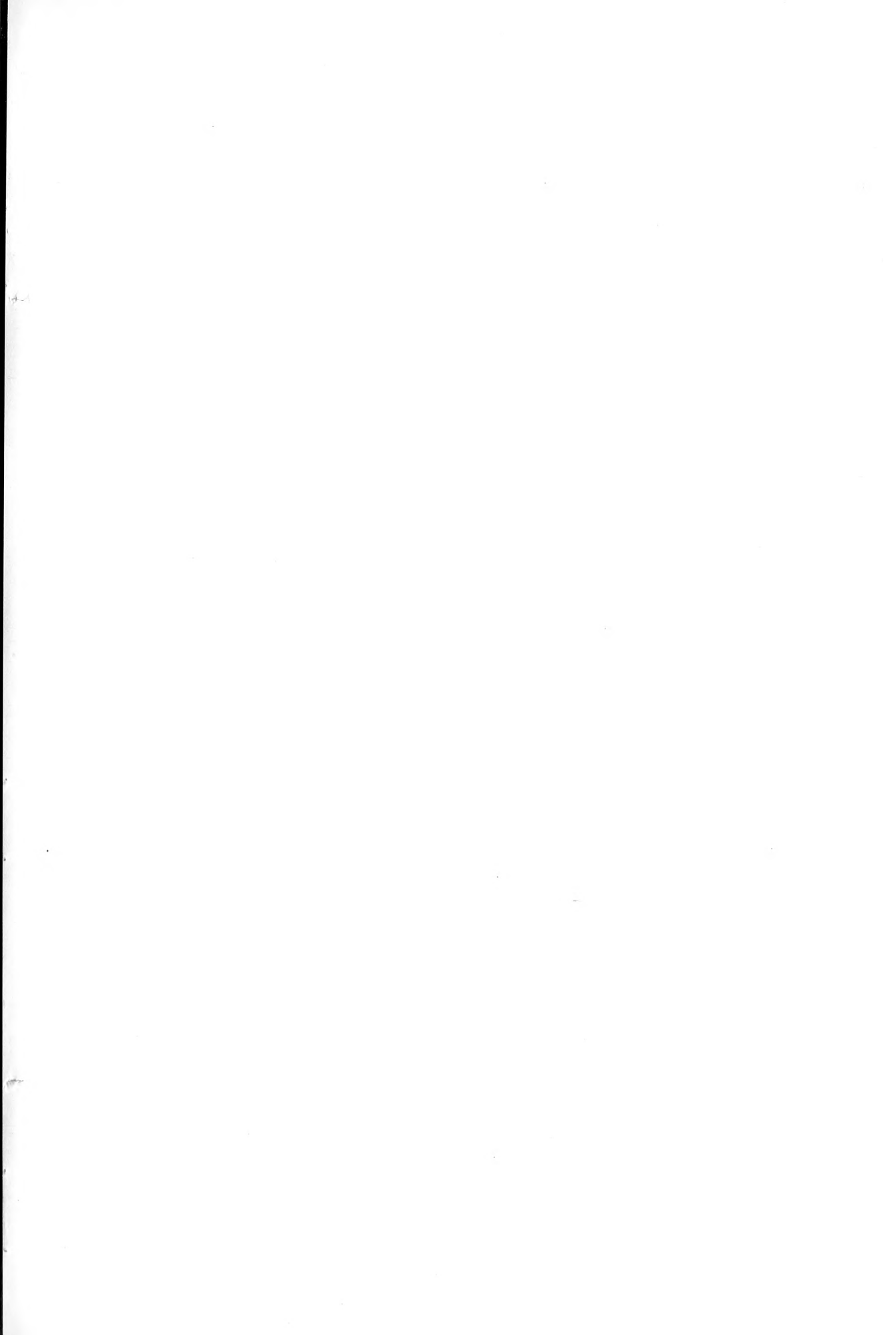
6. In a talking-machine, the combination with a sound-conveying tube, a fixed connecting part adapted to telescope therewith, one of said parts having longitudinal grooves, shoes carried in said grooves, and pivots carried by the other of said parts and engaging said shoes.

In witness whereof I have hereunto set my hand this 20th day of April, A. D. 1904.

JULIUS JETTER.

Witnesses:

LEWIS H. VAN DUSEN,
EDW. W. VAILL, Jr.



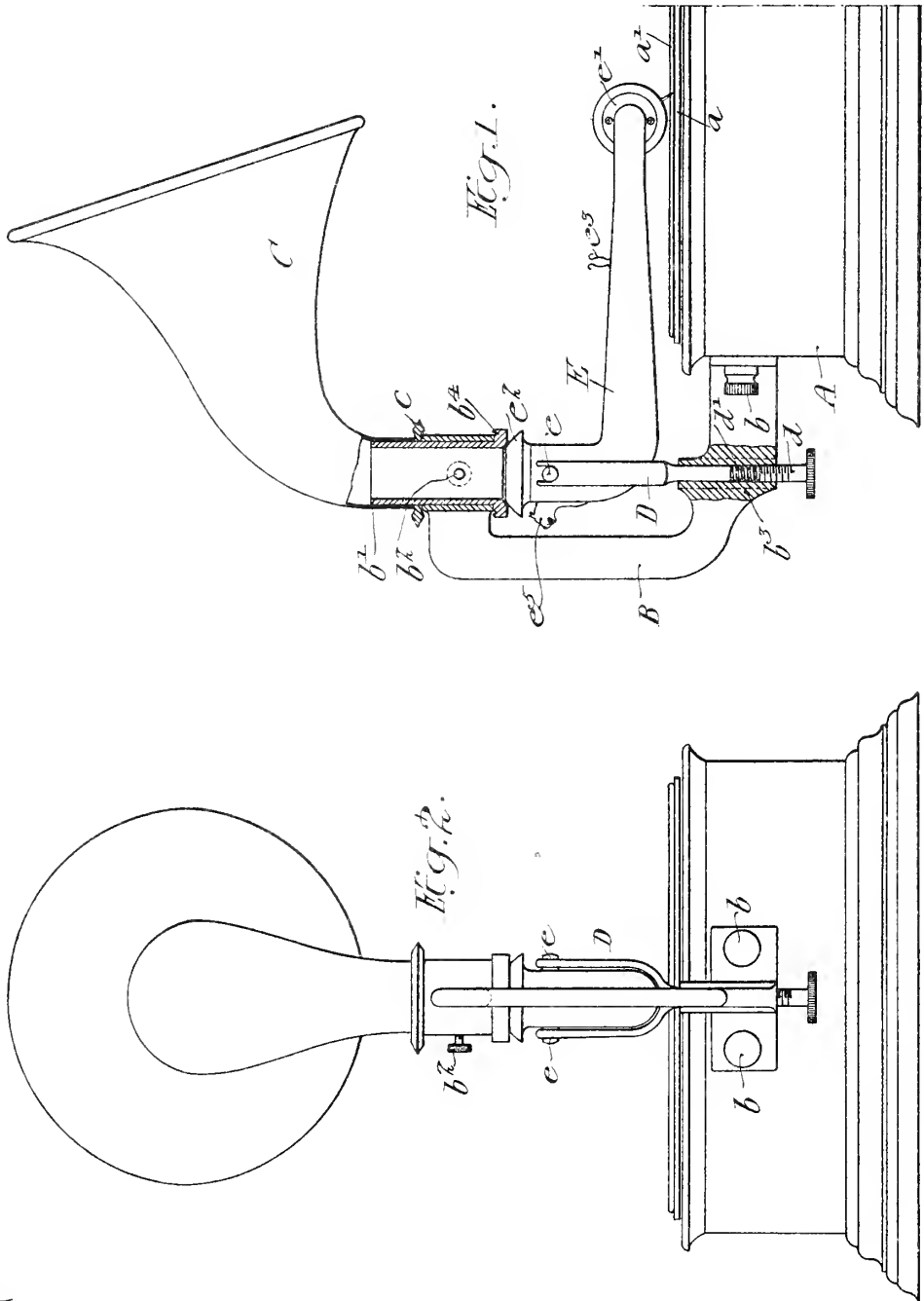
No. 776,194.

PATENTED NOV. 29, 1904.

H. E. MORGAN.
ARM FOR TALKING MACHINES.

APPLICATION FILED FEB. 17, 1904.

NO MODEL.



Witnesses:
Wesley A. Peck.
Titus N. Irons.

Inventor
Harry E. Morgan,
by his Attorneys,
Howson & Howson

UNITED STATES PATENT OFFICE.

HARRY E. MORGAN, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

ARM FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 776,194, dated November 29, 1904.

Application filed February 17, 1904. Serial No. 193,978. (No model.)

To all whom it may concern:

Be it known that I, HARRY E. MORGAN, a citizen of the United States, and a resident of Camden, New Jersey, have invented certain Improvements in Arms for Talking-Machines, of which the following is a specification.

My invention consists of a connecting and supporting arm for the sound-box of a sound recording and reproducing machine, commonly known as a "talking-machine," as hereinafter claimed.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, showing my improved device as applied to a talking-machine; and Fig. 2 is an end elevation of the apparatus shown in Fig. 1.

In the above drawings, A represents the box containing the mechanism for rotating a plate a , to which is removably fixed in any desired manner a disk a' , commonly known as a "record."

To one side of the box A is attached a bracket or standard B, removably held in position by means of screws b and having its top portion overhung or bent toward the box and formed for the reception of a flanged sleeve b' , held in position by a set-screw b'' . The upper end of this sleeve projects beyond the top of the standard for the reception of the horn C, and there is also on said projecting portion a collar c for a purpose hereinafter noted. In the line of the axis of the sleeve b' the standard B has an enlarged portion b^3 , formed tubular for the reception of the lower end of a forked piece D, and into the lower end of the tubular opening is threaded an adjustable screw d , having a spring d' confined between its upper end and the lower end of the piece D. The ends of the branches of said piece D are recessed for the reception of the trunnions e of the tube E, on the end of which is fixed the sound-box e' , it being noted that said tube gradually increases in area of cross-section from the sound-box toward its other end and

is bent, so that its two parts are substantially at right angles to each other at a point a short distance below its trunnions. The upper end e^2 of the tube E is flanged and preferably curved to form a portion of a spherical surface, being supported by the forked piece D and held against the lower flanged end b' of the sleeve b' by means of the spring d' , said end having, preferably, a portion formed as a spherical surface for the reception of the end of said tube. Upon the body of the tube E is fixed a clip e^3 , which when said tube is turned on its trunnions to a substantially vertical position engages the collar c , so as to retain the tube in such elevated position.

In operation it will be seen that the tube E is free to turn, so that the sound-box can move in a substantially horizontal plane, while the fork D moves on its vertical axis, and in addition said box is also free to move in a vertical plane, turning on the trunnions e .

By the use of the spring d' it will be seen that the fork D and the tube E carried thereby are yieldingly supported, while the screw d makes it possible to vertically adjust the position of the tube so as to force its upper end toward the flanged portion b' of the sleeve b' with any desired force. This upper end may, if desired, be out of mechanical engagement with the said portion b' of the sleeve connected to the horn, in which case it would prevent the vibrations of the material of the tube from being transmitted to the body of the horn itself, while in no way interfering with the free and uninterrupted vibration of the column of air within the tube and the horn. The position of the tube, however, is a matter depending upon the adjustment of the screw d .

As shown at e^5 , I may provide a counterweight of any required magnitude to balance the extended end of the tube E and the sound-box thereon, said weight being in the form of an ornamental projection attached to the vertical portion of said tube. It will be understood that said weight is carried on the

portion of the tube farthest from the sound-box, so that the trunnions are between the two centers of gravity of these respective parts.

I claim as my invention—

5 1. The combination in a talking-machine of a standard, a horn supported thereby, a forked piece yieldingly carried by the standard and having its lower portion only in engagement with the same, a tube carried by said piece
10 and communicating with the horn, and a sound-box on said tube, substantially as described.

2. The combination in a talking-machine of a standard having an overhanging portion, a horn supported thereby, a tube supported by
15 the lower portion of the standard so as to be maintained upright independently of other supports and out of engagement with the upper portion thereof, and a sound-box carried by the tube so as to be normally in communication with the end of the horn, substantially
20 as described.

3. The combination in a talking-machine of a standard, a horn supported thereby, a tube, a sound-box therefor and a supporting structure for the tube in addition to a record, said
25 structure being mounted at its lower end upon a portion of said standard so as to be maintained in its normally upright position independently of other supports, substantially as
30 described.

4. The combination in a talking-machine of a standard carrying at its upper part a horn, a tube having a sound-box normally in communication with the horn and a supporting structure for said tube mounted at its lower end
35 in the standard so as to be maintained in a substantially vertical position independently of other supports, with mechanism constructed to positively move said supporting structure,
40 substantially as described.

5. The combination in a talking-machine of a standard, a horn, means for supporting said horn, a screw adjustable in the standard, a spring supported thereby, a tube having a
45 sound-box, and a piece removably carried by the spring for supporting said tube in a position so that it communicates with the horn, substantially as described.

6. The combination in a talking-machine of a standard having an overhanging portion provided with a flanged sleeve for the reception of a horn, a forked piece carried by the standard and out of engagement with the overhung
50 portion, a tube having trunnions engaging the branches of said fork, one end of said tube being adjacent to the flanged portion of the sleeve, substantially as described.

7. The combination in a talking-machine of a standard, a horn, means for supporting said
60 horn, a collar, a forked piece carried by the standard independently of the part for supporting the horn, a tube carrying a sound-box

and a spring-clip on said tube constructed to engage said collar, substantially as described.

8. The combination in a talking-machine of
65 a standard having a portion whose lower end is flanged, an arm adjustably carried by the standard and engaged by the lower portion only thereof, a tube carried by said arm in such manner as to be movable in a vertical
70 plane, said tube having a sound-box and being flanged at that portion where it is adjacent to the flanged portion of the standard, substantially as described.

9. The combination in a talking-machine of
75 a standard having in its lower portion a substantially vertical tubular opening, a forked piece carried in said opening so as to be movable on a vertical axis, screw in the opening and a spring interposed between said screw
80 and the forked piece, a tube having trunnions engaging the branches of the forked piece, and a sound-box carried by the tube, substantially as described.

10. The combination of a standard having a
85 tubular portion for the attachment of a horn and a tube carrying a sound-box and supported by the lower portion of the standard, said tube being free to turn in vertical and horizontal planes and having a flanged portion
90 formed as a spherical surface, with a concave piece rigidly fixed to the tubular portion of the standard and shaped to receive the spherical end of the tube, substantially as described.

11. The combination of a standard having a
95 horn, with a tube having a sound-box, means for supporting said tube, a screw for carrying said means and a spring interposed between said screw and the tube-supporting means, substantially as described.
100

12. The combination of a standard having means for the attachment of a sound-transmitting device, a forked piece, a supporting-spring interposed between said piece and the standard, with a tube and a sound-box carried
105 by said forked piece, substantially as described.

13. The combination of a tubular arm having two portions bent at an angle to each other, one portion extending in a substantially vertical line, a counterweight carried by said vertically-extending portion and a sound-box
110 carried by the other portion, with means for supporting the whole of said tubular arm so that it is free to move in vertical and horizontal planes, and a structure engaging the lower portion of said means so as to maintain it in an upright position independently of other supports, substantially as described.
115

14. In a talking-machine, a bracket, a horn supported by said bracket, a sound-conveying
120 tube communicating with said horn, a supporting structure for said tube movably carried by said bracket at its lower end so as to be maintained upright independently of other

supports, said structure pivotally supporting said sound-conveying tube, substantially as described.

15 In a talking-machine, a bracket, a horn supported by said bracket, a sound-conveying tube communicating with said horn, a supporting structure for said tube having a forked upper end and movably supported at its lower end by said bracket so as to be maintained up-
10 right independently of other supports, said

structure pivotally supporting said sound-conveying tube between the forks of its upper end, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two sub- 15 scribing witnesses.

HARRY E. MORGAN.

Witnesses:

ELIAS H. WHITE,

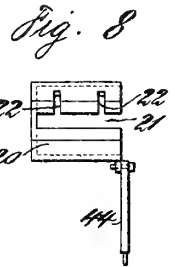
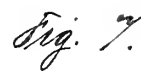
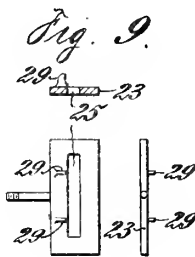
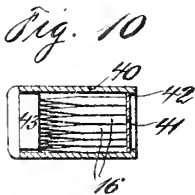
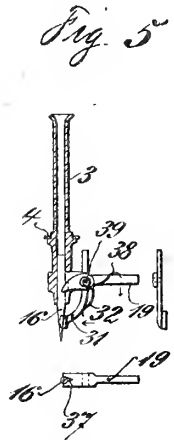
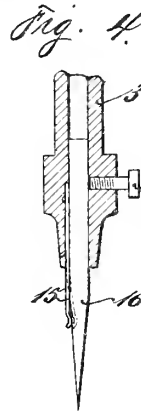
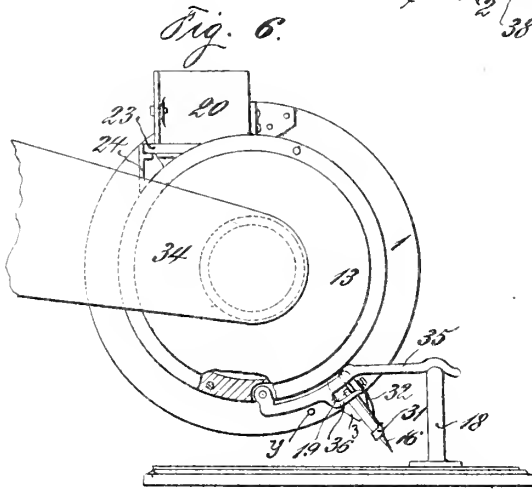
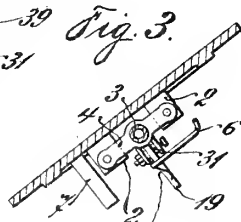
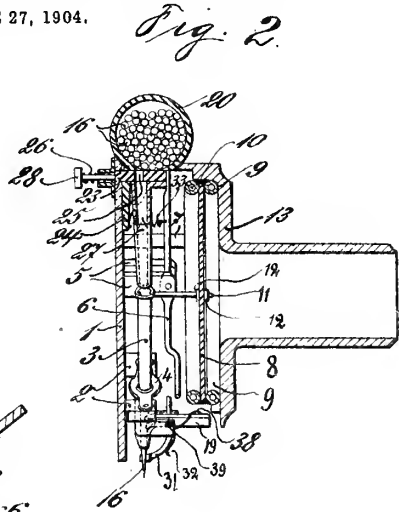
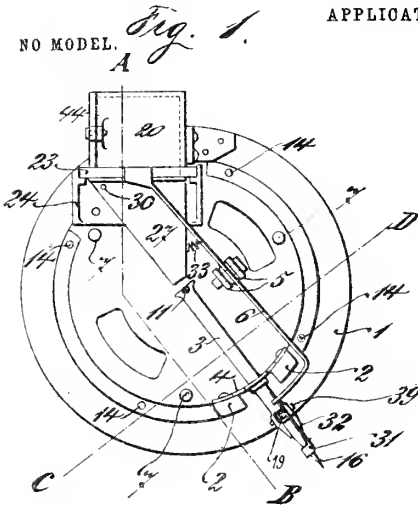
WILLIAM E. BRADLEY.



I. SCHMURKIN.
MECHANISM FOR CHANGING THE REPRODUCER PINS OF SOUND
REPRODUCING APPARATUS.

APPLICATION FILED JUNE 27, 1904.

NO MODEL.



Witnesses:
[Signature]
[Signature]

Inventor:
 Ivan Schmurkin.
 by *[Signature]* Attys.

UNITED STATES PATENT OFFICE.

IWAN SCHMURKIN, OF MOSCOW, RUSSIA.

MECHANISM FOR CHANGING THE REPRODUCER-PINS OF SOUND-REPRODUCING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 776,354, dated November 29, 1904.

Application filed June 27, 1904. Serial No. 214,334. (No model.)

To all whom it may concern:

Be it known that I, IWAN SCHMURKIN, a subject of the Czar of Russia, residing at Moscow, Russia, have invented certain new and useful
 5 Improvements in Mechanism for Changing the Reproducer-Pins of Sound-Reproducing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled
 10 in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

15 In sound-reproducing apparatus having sound-plates—such as the gramophone, zono-
 phone, graphophone—as is well known, it is necessary to insert a fresh pin in the pin-
 20 holder of the reproducer after each time of playing for the purpose of preventing the rapid destruction of the extremely-fine sound-reproducing corrugations of the plates.

Now this invention relates to mechanism which is designed to partly replace the opera-
 25 tion of the hand in changing the reproducing-pin by producing automatically the changing and fixing of said pin in the pin-holder when pressing on a knob.

30 In the accompanying drawings, which illustrate a reproducer provided with an example of the improved mechanism, Figure 1 is an inside view of the reproducer-lid, on which is fixed the pin-holder, and also the entire chang-
 35 ing mechanism. Fig. 2 is a section on the line A B of Fig. 1, showing the entire reproducer. Fig. 3 is a section on the line C D of Fig. 1. Fig. 4 shows, at an enlarged scale, the section of the lower part of a pin-holder as used with this invention. Fig. 5 is a section
 40 showing the modified pin-holder represented on Figs. 1 to 3 with its appurtenant parts. Fig. 6 is a general view of the reproducer in the position of rest in which the automatic changing of the pin is effected. Figs. 7 and 8
 45 are respectively a cross-section and an elevation of the pin-magazine. Fig. 9 represents detailed views of the slide hereinafter referred to. Fig. 10 shows the box for packing the
 50 pins for the purpose of facilitating the charging of the pin or needle magazine.

The lid 1 is provided on its inner side with projections 2 for the attachment of the pin or
 needle holder 3 in the ordinary way by means of a thin disk 4. The lid 1 is also provided
 with projections 5 for the axle of a lever 6
 55 and with three or more supports 7. On the latter there is fixed a flat metal ring (not shown) for the purpose of clamping the diaphragm 8
 in the usual manner between two rubber rings 9 and 10. The diaphragm is either stuck on
 60 the stud 11 of the pin-holder 3 or is fixed thereon—for instance, by means of the nuts 12, Fig. 2. The lid 1 itself is fixed on the repro-
 ducer-casing 13 by means of screws inserted
 65 through the apertures 14.

The needle-holder 3, Figs. 4 and 5, consists of a small tube open at both ends and wide
 enough to allow a reproducing-pin to slide
 through freely. On the lower end of this
 70 small tube there is mounted a pin-catching device—such as, for instance, a small flat spring
 15, Fig. 4, or the like—which prevents the
 pin 16, which is inserted with its point di-
 75 rected forward through the other end, from falling out and also retains the said pin in its
 operative position—that is to say, in the po-
 sition suitable for playing. The fixing of the
 pin is then effected either by means of the
 80 ordinary set-screw 17 or automatically on lift-
 ing the reproducer, &c., off the supporting-
 bracket 18, Fig. 6, by means of the spring-
 pressed clamping-lever 19, as hereinafter de-
 scribed.

For the purpose of inserting the pins 16
 85 singly with their points directed forward into the pin-holder 3 the following device is em-
 ployed: On the lid of the reproducer there is attached a cylinder 20, Figs. 7 and 8, which
 is open at one end and is provided with a
 longitudinal slot 21 and transverse slots 22.
 90 This cylinder is fixed with the slot 21 turned
 downward, Figs. 1, 2, and 6, in a horizontal
 or approximately horizontal position. The
 slide 23, which is capable of sliding in the
 95 frame 24, is arranged directly below the cyl-
 nder 20 and has a recess 25, Fig. 9. This
 slide in its forward end position, Fig. 2, which
 is determined by the elasticity of the spring
 26, closes entirely the slot 21 of the cylinder,
 and the recess 25 in the slide is situated over
 100

the flat funnel 27, which is open at the top and whose narrow exit-aperture is arranged directly over the preferably funnel-shaped enlarged upper end of the pin-holder 3. The pins 16 are pushed into the magazine 20 with their points in front, and they remain in this position in spite of unavoidable shocks, &c., because the inside diameter of the magazine, is smaller than the length of the pins. On pressing on the knob 28 of the slide 23, Fig. 2, in order to force the latter as far as possible into the reproducer-casing the recess 25 comes under the slot 21 of the magazine, through which a pin can readily fall out. In order to insure that the pins shall pass out of the magazine into the recess 25 in the slide even when they may have assumed an oblique position in the magazine, the slide is provided with projections 29, Fig. 9, which extend into the slots 22 of the magazine and which will always guide the pin situated directly in front of them with certainty in the correct position relatively to the slot 21. As only one pin at a time can find room in the slot 25, then as soon as the slide 23 is released and has been moved back by the action of the spring 26 only one needle at a time will be moved in a horizontal position into the funnel 27; but since the heavier thick end of the pin will come at once against the inclined side wall of the funnel or against a stop—for instance, the stud 30, Fig. 1—provided specially for this purpose the pin will turn inside the funnel with its point downward and will pass in this position into the pin-holder 3. A flat spring 15 or the like on the lower end of the pin-holder will allow the pin to project only to about half its length—that is to say, with its pointed conical portion from the pin-holder. The pin can then be fixed by means of the usual set-screw.

In the apparatus just described the pin after playing must be removed by hand after the set-screw has been loosened. In order to obviate this, there may be employed a suitably-formed small lever 31, Figs. 5, 1, 2, and 3, which is mounted on the pin-holder for the purpose of catching the pin inserted in the pin-holder in the correct position. This lever is held by the spring 32 in its operative position, and when the slide 23 is pushed into the reproducer it is moved away from the pin by means of the lever 6, that is mounted in the supports 5. If then the slide with the fresh pin in its recess moves back into its position of rest, the lever 6 will be caused by the spring 33, Figs. 1 and 2, to rock in the opposite direction, and thus entirely release the lever 31, so that the pin which is now introduced is caught by it again in the position suitable for playing. For the purpose of obviating also the necessity for fixing the needle by hand in the pin-holder there may be employed, according to this invention, a

spring-pressed clamping-lever 19, Fig. 5. During the operation of changing the pin this lever is held in a position in which the pin sliding down in the pin-holder can pass freely past the said lever. This holding of the lever 19 is effected by placing the reproducer, with the sound-tube 34, Fig. 6, upon the supporting-bracket 18 by means of the arm 35, Fig. 6, which is mounted on the part 13 of the reproducer-casing, whereby the hook 36 of the lever-arm 35 raises the long arm of the clamping-lever 19, and thus turns back the short arm of the latter, which is conveniently provided with a recess 37 in its end. When the reproducer is lifted off the supporting-bracket 18, the arm 35 releases the clamping-lever 19 and is kept entirely out of contact therewith by means of a suitable stud μ , provided on the casing of the reproducer. The weak spring 38 then presses the lever 19 against the pin 16, Fig. 5, with a force which is sufficient to produce a clamping of the pin in the pin-holder as soon as the point of the pin is placed upon the sound-plate for the purpose of playing. The greater the weight (the weight of the reproducer, sound-tube, &c.) resting on the pin—that is to say, the greater the force which has a tendency to push the pin into the pin-holder—the more firmly will the pin be clamped in its place and position, because the point of contact between the pin and the lever 19 is situated on a somewhat lower level than the axle 39 of the latter, upon which axle also the catch-lever 31 is loosely mounted. In the new apparatus constructed in this manner it is merely necessary to place the reproducer, &c., upon the supporting-bracket 18, as shown in Fig. 6, in order to release the worn reproducer pin or needle, so that by pressing on the knob 28 of the slide and releasing the same an automatic changing of the reproducing-pin is effected. As during the playing neither the lever 6 is touching the catch-lever 31 nor the arm 35 is touching the clamping-lever 19, the pin-holder 3, which is fixed to the small elastic steel plate 4, can vibrate with complete freedom, as in all other reproducers.

In order to be able to readily fill the magazine 20 with reproducing-pins, it is advisable to pack such pins in cylindrical boxes 40, Fig. 10, of such diameter as will allow of pushing said boxes into the magazine. These boxes have a bottom 41 resting loose on the beading or flange 42. They are closed at the other end by means of a plug of metal or wood 43 or the like. The points of the pins 16 are arranged facing the plug, and the charging of the magazine is effected (after having first removed the plug 43) by pushing the box, with its open end foremost, partly into the magazine and then knocking the bottom 41 into the box by means of a plunger or the like, and thus pushing the pins out

of the box and into the magazine, the latter being then closed by the lid 44 after the box 18 has been removed.

What I claim is—

5 1. In mechanism for changing the reproducing-pins of sound-reproducing apparatus having sound-plates, in combination with the re-
10 5 producer, an approximately horizontal cylinder for containing reproducing-pins, attached to the reproducer and formed with a longitudinal slot, a slide, a flat funnel, a tubular pin-
15 10 holder and a spring device whereby the reproducing-pins contained in the said cylinder pass singly through the said longitudinal slot
20 15 into the said slide by which they are transferred into the said flat funnel from which the said pins slide point foremost into the said pin-holder at the lower end of which they
25 20 are caught and fixed in the operative position by the said spring device, substantially as set forth.

2. In mechanism for changing the reproducing-pins of sound-reproducing apparatus having sound-plates, in combination with the re-
25 25 producer, an approximately horizontal cylinder for containing reproducing-pins, attached to the reproducer and formed with a longitudinal slot, a slide, a flat funnel, a tubular pin-holder, a spring-pressed catch-lever
30 30 mounted on the said pin-holder, and a releasing-lever, whereby the said catch-lever is raised off the pin to be changed by the said slide by means of said releasing-lever, so soon
35 35 as the said slide is pushed out of the magazine for the purpose of transferring a fresh pin into the pin-holder, substantially as set forth.

3. In mechanism for changing the reproducing-pins of sound-reproducing apparatus having sound-plates, in combination with the re-
40 40 producer, an approximately horizontal cylinder for containing reproducing-pins, attached to the reproducer and formed with a longitudinal slot, a slide, a flat funnel, a tubular pin-holder, a spring-pressed catch-lever
45 45 mounted on the said pin-holder, a releasing-lever, a spring-pressed pin-holding lever mounted on the pin-holder, a supporting-bracket, and a supporting-arm whereby the said pin-holding lever is turned aside during
50 50 the changing of the needle, by placing the reproducer with the sound-tube on the said supporting-bracket by means of said supporting-arm, substantially as set forth.

4. In mechanism for changing the reproducing-pins of sound-reproducing apparatus having sound-plates, in combination with the re-
55 55 producer, a pin-magazine, and a box having a movable bottom whereby the pin-magazine can be readily charged with pins by pushing
60 60 the bottom to move the pins into the magazine, substantially as set forth.

5. In mechanism for changing the reproducing-pins of sound-reproducing apparatus, the combination with a magazine and a pin-holding
65 65 element, of pivoted means to catch the pin

at the end of the element and means to deliver pins one at a time to said element, substantially as described.

6. In mechanism for changing the reproducing-pins of sound-reproducing apparatus, the combination with a magazine and a pin-holding
70 70 element, of a lever to catch the pins at the end of the element, means to deliver pins one at a time to the pin-holding element and mechanism operated by said means to operate the
75 75 catching-lever to release that pin at the end of the element, substantially as described.

7. In mechanism for changing the reproducing-pins of sound-reproducing apparatus, the combination with a magazine and a pin-holding
80 80 tube, of means to catch the pins at the end of the tube, means to transfer pins one at a time from the magazine to the tube and a pin-securing device at the end of the tube, substantially as described.

8. In mechanism for changing the reproducing-pins of sound-reproducing apparatus, the combination with a magazine and a pin-holding
85 85 element, of a device to catch the pins at the end of the element, means to transfer
90 90 pins, one at a time, from the magazine to the pin-holding element, mechanism operated by the means to transfer the pins from the magazine to actuate the catching device to release
95 95 that pin in the end of the element, and a pin-securing device to secure the pin after being caught, substantially as described.

9. In mechanism for changing the reproducing-pins of sound-reproducing apparatus, the combination with a magazine and a pin-holding
100 100 tube, of a slide to deliver pins one at a time from the magazine to the tube, a catching-lever at the end of the tube, means to release the latter and operated by the slide, and a spring-held pin-securing lever, substantially
105 105 as described.

10. In mechanism for changing the reproducing-pins of sound-reproducing apparatus, the combination with a magazine having a longitudinal opening beneath and transverse
110 110 slots 22, of a slide beneath the opening and having a slot to receive a single pin, lugs on the slide proximate the slot and adapted to enter the slots 22 to aline the pins in the magazine during the movement of the slide, and a
115 115 guide-receptacle into which the slide delivers the pin, substantially as described.

11. In mechanism for changing the reproducing-pins of sound-reproducing apparatus, the combination with a cylindrical magazine
120 120 having a longitudinal delivery-slot and transverse slots 22, of a spring-retracted slide having a slot to receive a single pin, lugs on the slide to enter slots 22 and aline pins in the magazine, a guide-receptacle to receive the
125 125 pins from the slide and means to cause the pins to fall point down in said receptacle, substantially as described.

12. In mechanism for changing the reproducing-pins of sound-reproducing apparatus, 130

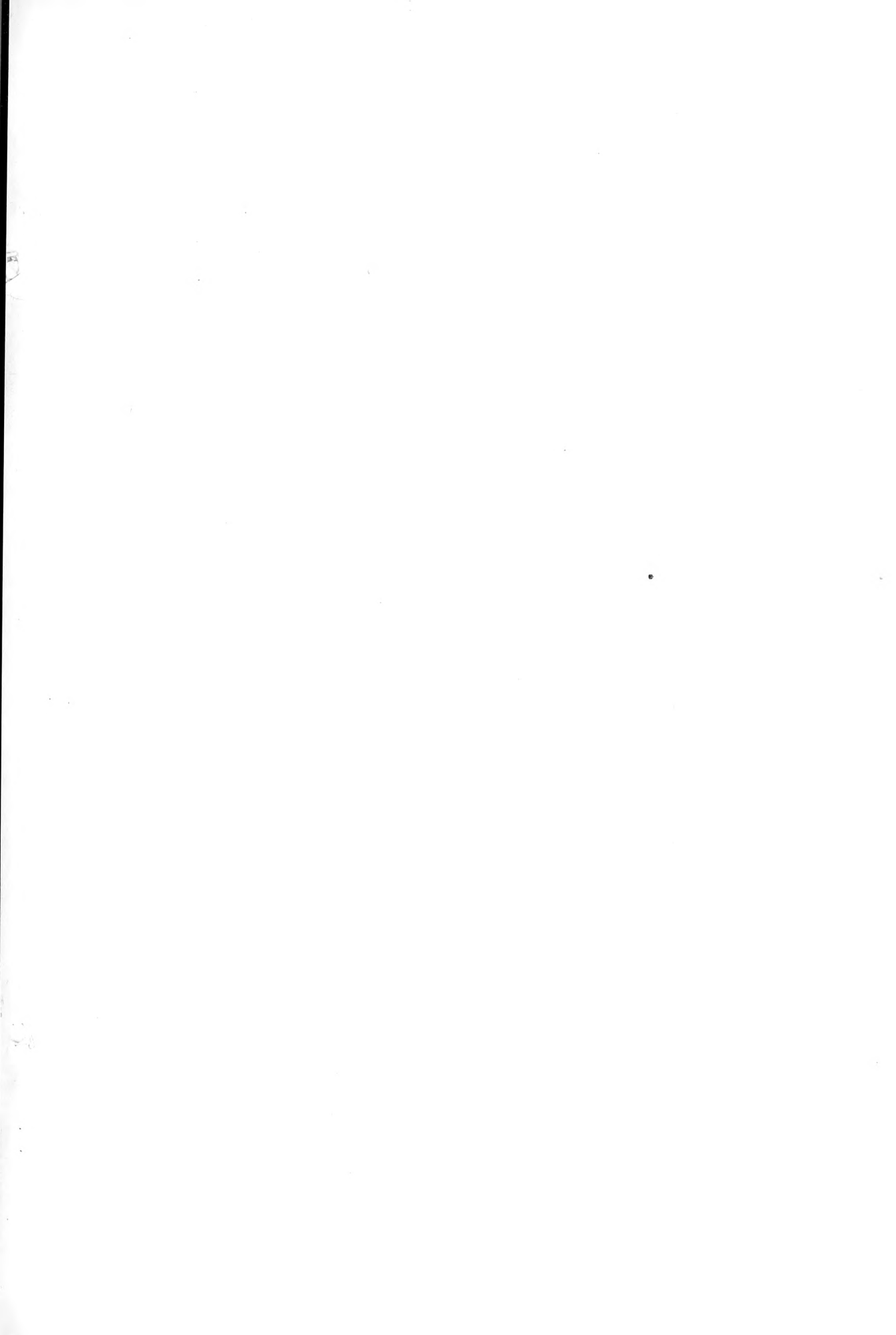
the combination with a magazine, of a guide-
receptacle, a slide between the receptacle and
magazine to deliver pins one at a time from
the latter to the former, a stud in the recep-
5 tacle and path of the pin to cause it to fall
point down, and means below the receptacle
to hold the pin, substantially as described.

In testimony that I claim the foregoing as
my invention I have signed my name in pres-
ence of two subscribing witnesses.

IWAN SCHMURKIN.

Witnesses:

IWAN ALEXEIEFF,
GUSTAV T. HARTING.

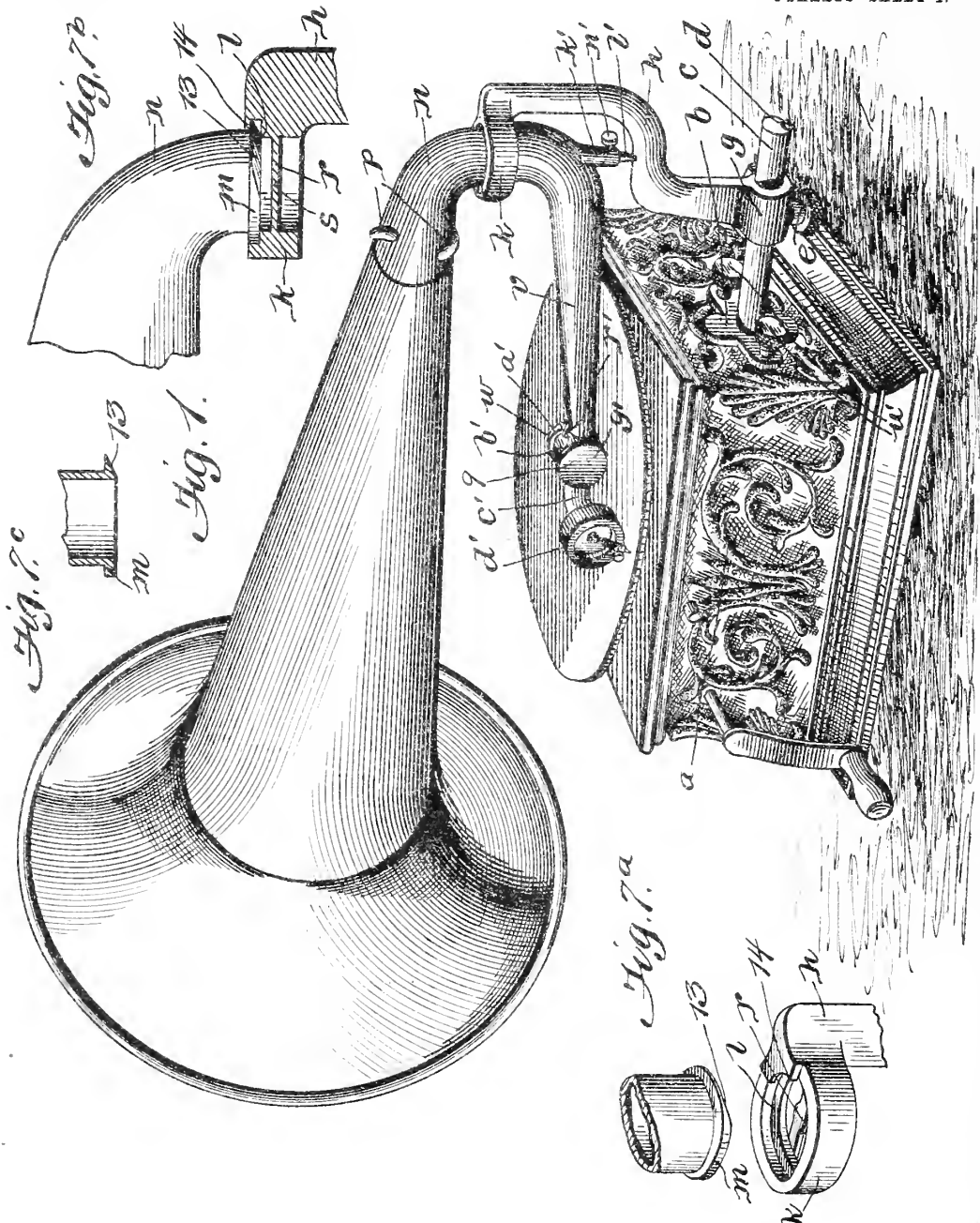


H. B. McNULTY.
TALKING MACHINE.

APPLICATION FILED JULY 21, 1904.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses
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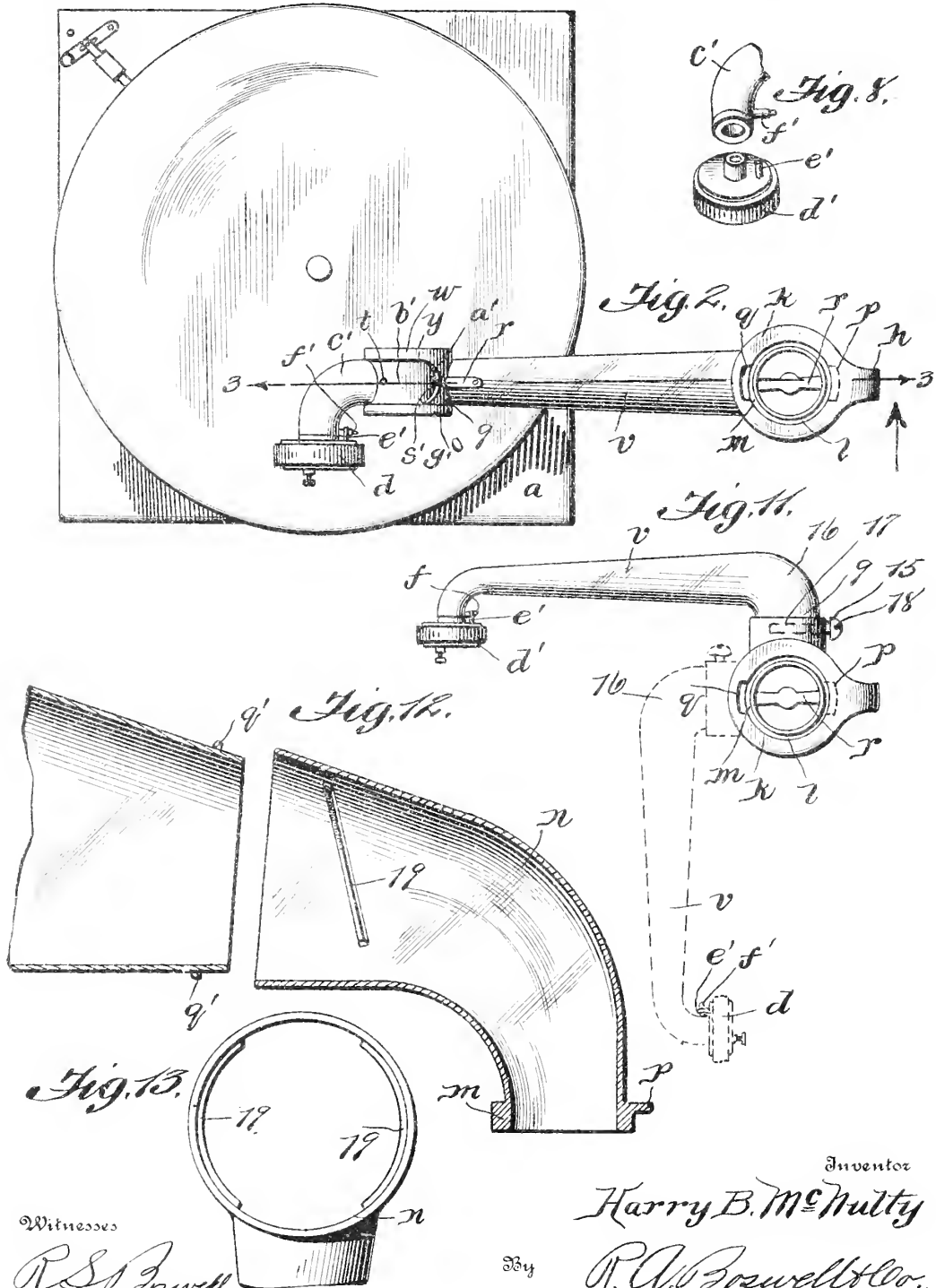


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4 SHEETS—SHEET 2.



Witnesses

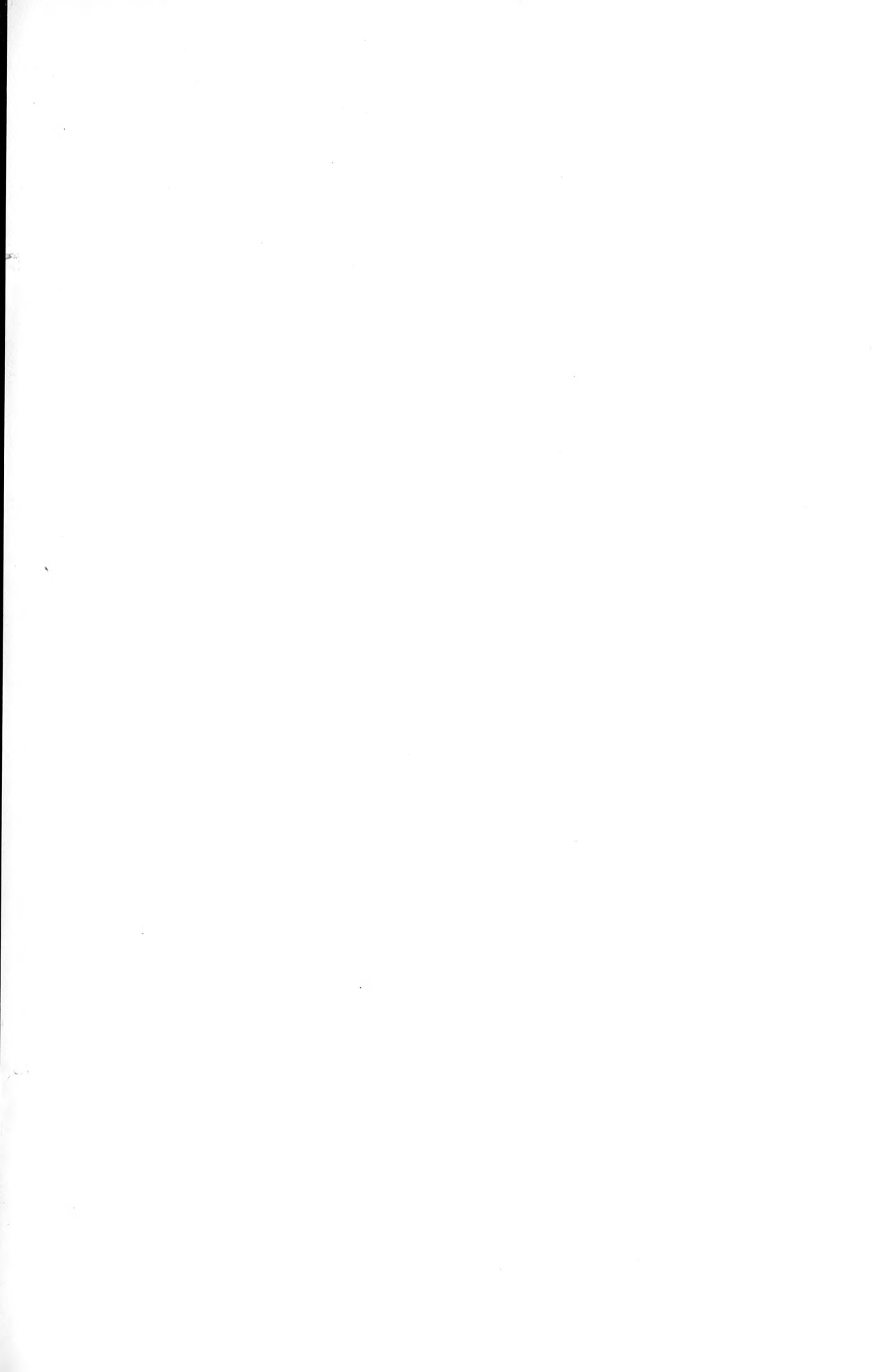
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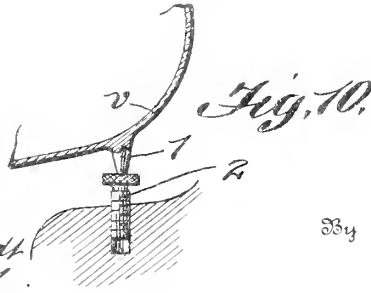
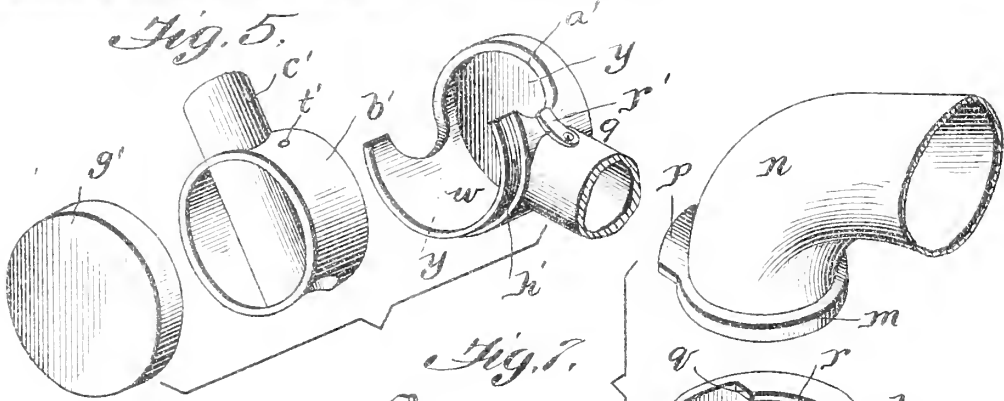
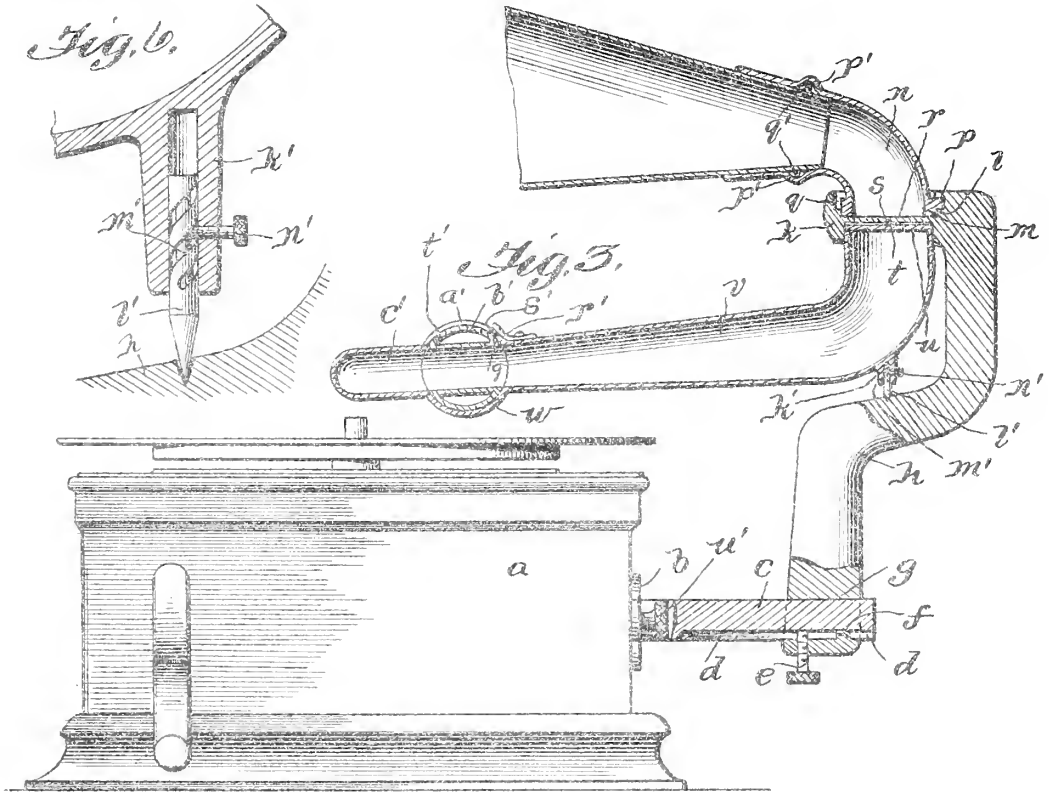
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his Attorneys



H. B. McNULTY.
TALKING MACHINE.
APPLICATION FILED JULY 21, 1904.

NO MODEL.

4 SHEETS—SHEET 3.

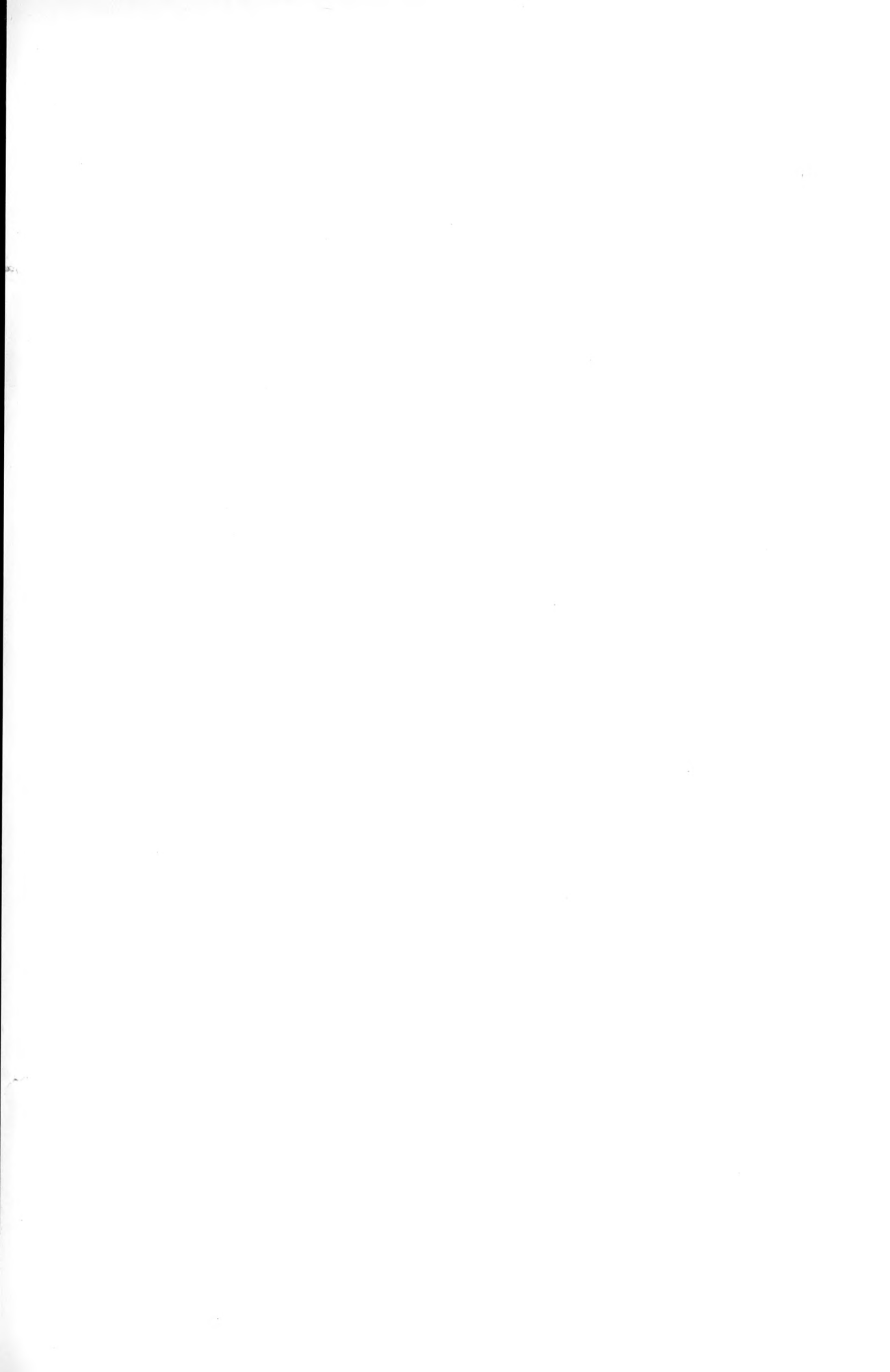


Witnesses

Louis H. Schmidt
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334

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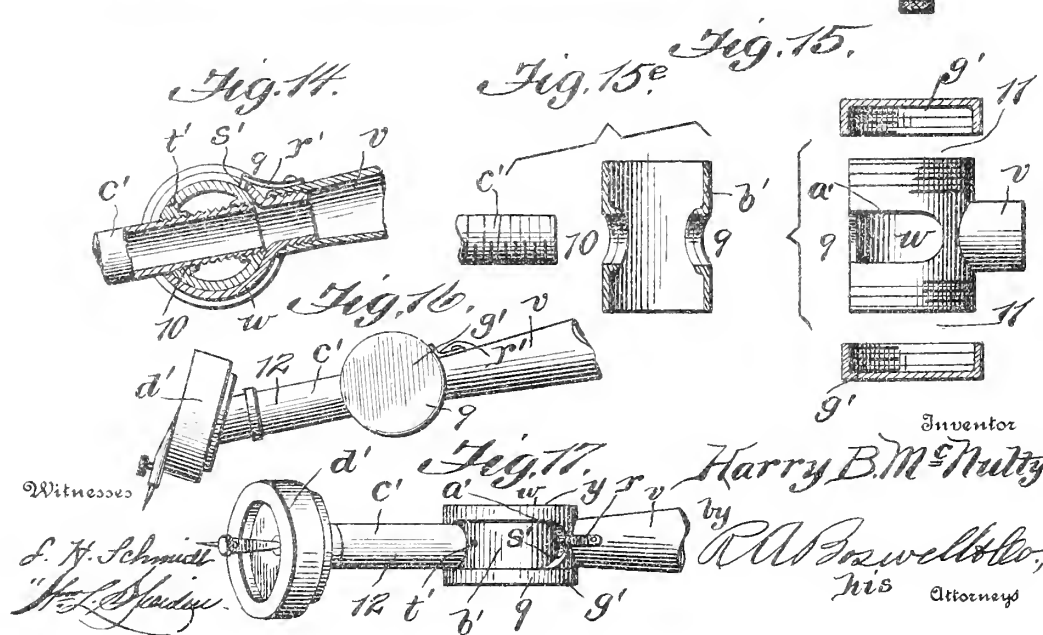
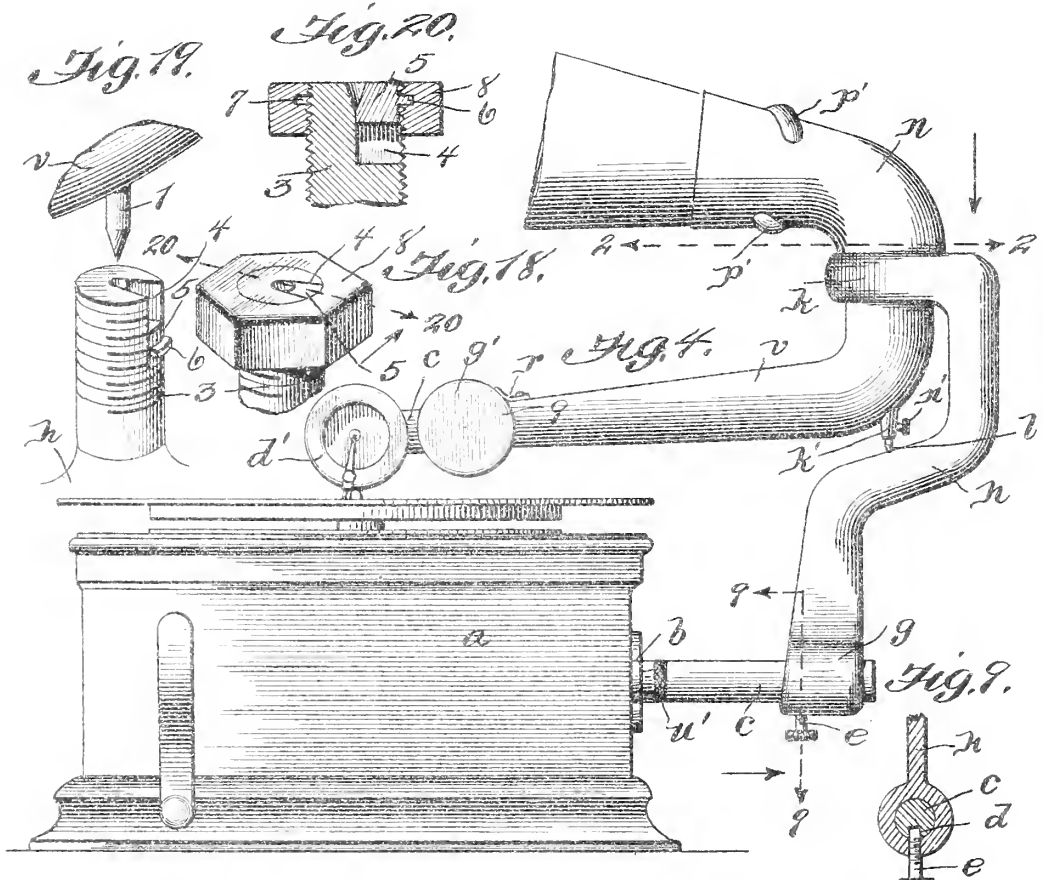


H. B. McNULTY.
TALKING MACHINE.

APPLICATION FILED JULY 21, 1904.

NO MODEL.

4 SHEETS—SHEET 4.



Witnesses
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 his Attorneys

UNITED STATES PATENT OFFICE.

HARRY B. McNULTY, OF WASHINGTON, DISTRICT OF COLUMBIA.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 776,672, dated December 6, 1904.

Application filed July 21, 1904. Serial No. 217,491. (No model.)

To all whom it may concern:

Be it known that I, HARRY B. McNULTY, a citizen of the United States, residing at Washington city, in the District of Columbia, have invented certain new and useful improvements in conical double-jointed arms for talking-machines, designed to carry the sound-box at its extreme end, incidentally for the support of said arm and horn and also a double sound-box; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification.

This invention relates to new and useful improvements in the detail construction of that part of a talking-machine that is known as a "conical double-jointed arm," designed to carry the sound-box at its extreme end, incidentally for the support of said arm and horn.

The object of the invention is to provide an improved sound-box connection and support of such a design and construction that it shall be free to accommodate itself to records of different thicknesses and breadths as well as to the unevennesses in the record itself.

More especially, the invention provides means whereby the sound-box-carrying arm and support will be vertically and horizontally adjustable at will to any make of machine and is, furthermore, to provide a conduit and connections for the same from the sound-box to the horn of such a construction and combination of parts that the volume of sound delivered from a given record shall be clear and distinct and at the same time obviates certain elements which have heretofore been objectionable and, moreover, to construct the details of the invention in such wise as to direct the sound straight to the ear instead of over the head.

Also the invention consists in an especially-designed joint between the conical arm and the elbow-coupling, thereby obviating the rattle that has been noted in other devices of this character, as herewith claimed.

A still further object of the invention is to provide a device of this character which may be assembled or disassembled at will without the use of tools.

This invention comprises, further, the various modifications, details of construction, adaptation, and novel combination of features, which will be hereinafter more fully described and then specifically defined in the appended claims.

The invention is illustrated by the accompanying drawings, which, with the characters of reference marked thereon, form a part of this application, such characters of reference indicating like parts in the views.

Figure 1 is a perspective view of the improved device as applied to a talking-machine; Fig. 2, a sectional view on the line 2 2 of Fig. 4; Fig. 3, a longitudinal vertical sectional view through the conical arm, its connections, and support therefor; Fig. 4, a side elevation of the device as applied to a talking-machine; Fig. 5, a view of the joint between the conical arm and the elbow-coupling, showing the manner of disassembling; Fig. 6, a detail view of the preferred form of the pivotal cone-bearing at the rear of the conical arm; Fig. 7, a view showing the manner of disassembling and assembling the coupling between the horn and the top of the support; Fig. 7^a, a modification of the features shown in Fig. 7, showing it as disassembled; Fig. 7^b, a sectional view of Fig. 7^a, showing it assembled; Fig. 7^c, a detail of one of the parts shown in Figs. 7^a and 7^b; Fig. 8, a view showing the manner of connecting the sound-box; Fig. 9, a sectional view on the line 9 9, Fig. 4; Fig. 10, a detailed view of a modified form of the pivotal cone-bearing at the rear of the conical arm; Fig. 11, a detail view of a modified form of the conical arm and its connections; Fig. 12, a detail view of a modified form, showing the manner of assembling and disassembling the horn; Fig. 13, an end view of the coupling between the horn and support, showing the form shown in Fig. 12; Fig. 14, a sectional view of a modified form of joint between the conical arm and elbow-coupling. Figs. 15 and 15^c are views of the form shown in Fig.

14, showing the manner of assembling and disassembling; Fig. 16, a view of a modified form of coupling between the sound-box and joint at the end of the conical arm; Fig. 17, a top plan view of Fig. 16; Fig. 18, a detail perspective view of a modified form of the pivotal cone-bearing for the rear portion of the conical arm; Fig. 19, a detail view showing the manner of disassembling and assembling the parts of the form shown in Fig. 18; Fig. 20, a sectional view on line 20 20 of Fig. 18.

Referring to and designating the different parts and modifications of the accompanying drawings by letters and numerals, *a* indicates an ordinary talking-machine which has secured thereto a plate *b*, said plate *b* being made integral or detachable, preferably integral, with the rod *c*, of cylindrical character, which is provided on its underneath side with a rectangular slotway *d*, adapted to receive the tightening-screw *e* and the guide-stud *f*, carried by the cylindrical bearing *g* of the arm-support *h*, which is slidably mounted upon the rod *c*.

Made integral with the top of the arm-support *h* is a collar *k*, which has an inner bearing *l*, adapted to receive the flange *m*, which is made integral with the elbow-coupling *n*. Projecting from said flange *m* is a projection *p*, which is utilized in locking the elbow *n* in such a manner as to allow for free movement after attaching the elbow-coupling—that is to say, when it is necessary to register the projection *p* with the cut-away portion *q*, similar in shape, you then insert the said coupling *n* and give a partial turn until it is in locked position, as illustrated in the drawings.

Spanning the opening in the collar *k* is a bar *r*, having a cone-bearing *s*, adapted to receive a small cone-shaped projection *t*, which projects from a bar *u*, said bar *u* being made integral with the upper part of the right-angled turn of the conical arm *v*.

w designates a chamber, being closed at one end and open at the other, as at *y y*, and also provided with a cut-away portion *a'* in slot form, said chamber being made integral with the conical arm *v*. Mounted to have a loose movement in the chamber *w* is a ring-band *b'*, having brazed or soldered across the diameter of the same the hollow shank portion of another elbow-coupling, *c'*, adapted to be connected to the sound-box, said sound-box *d'* being provided with an abutment-lug *e'* to engage a similar lug *f'* on the elbow-coupling *c'* for the purpose of erecting the sound-box in correct position to act upon the record. For the purpose of closing the chamber *w* after the ring-band has been inserted I provide a cap *g'*, having threads to engage threads *h'* upon the chamber *w*. To allow for adjustment and swinging movement, I provide the rear convexed portion of the conical arm with a hollow extension *k'*, designed for the purpose of receiving the pin *l'*, which is pro-

vided with a spiral cam-thread *m'*. Mounted in the wall of said extension *k'* and adapted to engage with the spiral cam-thread is a thumb-screw *n'* to limit the said adjustment. There are two cam-slots *p'* provided upon the inside of the enlarged ends of the elbow-coupling *n* for the purpose of engagement with the lugs *q'*, mounted upon the tapered end of the horn. To secure box up out of engagement with the record, I provide means consisting of a spring-catch *r'*, riveted to the chamber *w*, said catch being provided with a lug *s'*, designed for engagement with a notch *t'* upon the ring-band *b'*. Thumb-screws *u'* are used to securely attach the plate *b* to the side of the talking-machine *a*. Figs. 7 and 21 illustrate a slight modification of the adjustment of the conical arm, whereby the rear convex portions of the said arm are provided with a cone-shaped stud 1, designed to have a bearing in the head of an adjusting thumb-screw 2. Figs. 18, 19, and 20 also illustrate a slight modification of the pivotal conical arm. In this case the cone-shaped stud 1 is designed to have a bearing in the top of a screw-threaded stud 3, made integral with the arm-support *h*, said stud 3 having a V-shaped way 4. Mounted to have a vertical movement in said way 4 is a V-shaped slide 5, which has provided on its outer face a projection 6, designed to have play in the circumferential groove 7, provided in the inner threaded portion of the nut 8. It will be readily understood how the arm *v* is disassembled from position by the construction shown in Figs. 18, 19, and 20.

In Figs. 14, 15, and 15^e I have shown a modification of the joint 9, whereby the elbow-coupling *c'* is detachable, as at 10, from the ring-bearing *b'*. Also both ends of the chamber *w* are opened, as at 11, adapted to be closed by two caps *g'* instead of one. In Figs. 16 and 17 the coupling *c'* is shown as being straight, as at 12, and the sound-box shown at right angles to that shown in other figures of the drawings.

Figs. 7^a, 7^b, and 7^c show a modification of the connection between the elbow *m* and the collar *k*, thereby obviating both the projection *p* and the cut-away portion *q* and substituting in lieu thereof a bevel 13 upon the lower face of the flange *m* of the elbow-coupling. In connecting the coupling *n* it is necessary to make a scooping movement to bring the upper edge of the flange *m* under the slight extension 14, made integral upon the collar *k*.

In Fig. 11 the joint 9 is located at the rear portion of the arm *v*, as at 15, the said arm *v* having a turn at 16 and provided with a slot 17 to receive the shank portion of a screw 18, the said screw being provided for the purpose of keeping the arm *v* from being detached, but at the same time allow the said arm *v* to have a quarter-turn when it is necessary to raise the sound-box from the record.

In Figs. 12 and 13 the coupling *n* has two cam-threads 19 performing the same function as the slots *p*'.

Of course it is understood that various changes can be made in the details of construction and combination of parts other than that illustrated in the accompanying drawings without in any way departing from the spirit and scope of the invention.

Having therefore described my invention, what I claim as new, and desire to secure and protect by Letters Patent, is—

1. A talking-machine, having a pivotal swinging reproducer-arm and an adjustable support therefor, comprising a rod adapted to be secured to said machine-casing, a bearing carrying means adapted to rigidly support said arm from having a rotary movement, said arm being adjustable longitudinally on said rod and a thumb-screw mounted in said bearing to engage said rod to hold said arm and bearing in adjusted position, substantially as shown and described.

2. In a talking-machine, the combination of the casing and arm, having at its rear convex portion a cylindrical hollow extension, adapted to receive a cone-shaped pin having a spiral cam-thread, a thumb-screw, adapted to engage said spiral cam-thread, to allow for vertical adjustment of said arm, substantially as shown and described.

3. A talking-machine, having a pivotal swinging reproducer-arm, and an adjustable support therefor comprising a rod adapted to be secured to said machine-casing, a bearing carrying means adapted to rigidly support said arm from having a rotary movement, said arm being adjustable longitudinally on said rod and a thumb-screw and guide-stud mounted in said bearing to engage said rod to hold and guide said arm and bearing in adjusted position, substantially as shown and described.

4. A talking-machine, having a coupling, a support therefor and connections therebetween, comprising a flange carrying a projection, a collar integral with said support and a cut-away portion in said collar which is adapted to receive said flange and projection and hold said coupling in a pivotal manner, substantially as shown and described.

5. A talking-machine, having a coupling, a support therefor, and connections therebetween comprising a flange and bevel upon its lower face thereof, a collar and a slight extension integral with said support which are adapted to receive and maintain the said flange and coupling in a pivotal manner, substantially as shown and described.

6. A talking-machine comprising a swinging reproducer-arm, having a joint on said arm near the sound-box, comprising a cylindrical chamber having a cut-away portion, a ring-band which is carried by the coupling carrying said sound-box, said ring-band being mounted in said chamber, threads upon said

chamber which engage threads in a cap, which is adapted for closing said joint and means for maintaining the sound-box out of engagement with the record, substantially as shown and described.

7. A talking-machine, comprising a swinging reproducer-arm having a joint on said arm near the sound-box, comprising a cylindrical chamber open at both ends having a slot therein, a ring-band which is detachably connected to the coupling carrying said sound-box, said ring-band being mounted in said chamber, caps for closing said chamber and means mounted upon said reproducer-arm to hold the sound-box out of engagement with the record, substantially as shown and described.

8. A talking-machine comprising a swinging reproducer-arm, having a joint on said arm near the sound-box, comprising a cylindrical chamber having a cut-away portion, a ring-band which is carried by the coupling carrying said sound-box, said ring-band being mounted in said chamber, said chamber having threads which engage threads in a cap which is adapted for closing said joint, means for holding said sound-box out of engagement with the record and adjustable means at the rear convex portion of said reproducer-arm, to allow for vertical adjustment of said reproducer-arm, substantially as shown and described.

9. A talking-machine having an adjustable support for the reproducer-arm and horn, a coupling mounted upon said support connections between said coupling and horn comprising oppositely-disposed interrupted cam-threads carried by said coupling, and oppositely-disposed interlocking lugs integral with the tapered end of said horn which are adapted to engage with said interrupted cam-threads, substantially as described.

10. In a talking-machine, the combination of the casing, the conical arm, a joint on said arm to allow the sound-box to be lifted from the record, said conical arm provided at its rear convex portion with a cone-shaped stud, a screw-threaded stud in which said cone stud engages, said screw-threaded stud having a V-shaped way, a slide therein, an extension integral thereon, a nut on said stud having an inner circumferential groove, with which said extension engages, a support for said threaded stud, a coupling mounted upon said support, a horn provided with interlocking lugs, said couplings having cam-threads adapted to act in connection with the lugs upon the horn and means mounted upon said arm to hold the sound-box out of engagement with the record, substantially as specified.

11. A talking-machine comprising an adjustable support for the swinging reproducer-arm, a coupling mounted upon said support, a horn provided with interlocking lugs, adapted to cooperate with oppositely-disposed

broken cam-threads, upon the inner circumference of said coupling, said threads being inclined spirally in the opposite direction from each other and adjustable means mounted upon the rear convexed portion of said swinging reproducer-arm to allow for vertical adjustment of said reproducer-arm, substantially as shown and described.

12. A talking-machine comprising an adjustable support for the swinging reproducer-arm, a coupling mounted upon said support, a horn provided with interlocking lugs, said coupling having an interrupted cam-thread adapted to act in connection with the lugs upon the horn, said coupling having a flange carrying a projection, a collar integral with said support and a cut-away portion in said collar which is adapted to receive said flange and projection and hold said coupling and horn in a pivoted manner, substantially as specified.

13. A talking-machine comprising, in combination with a casing, a conical reproducer-arm and an adjustable support therefor comprising a rod adapted to be secured to said machine-casing, a bearing carried by the vertical portion of said support, said vertical portion consisting of a lower vertical portion, an upper vertical portion and a horizontal portion intermediate therebetween, said bearing carrying means adapted to rigidly support said arm from having a rotary movement, said arm being adjustable longitudinally upon said rod, and a thumb-screw mounted in said bearing to engage said rod to secure said arm and bearing in adjusted position, substantially as specified.

14. A talking-machine comprising, in combination with a casing, a conical reproducer-arm and an adjustable support therefor, comprising a rod adapted to be secured to said machine-casing, a slot in said rod, a bearing carried by the vertical portion of said support, said vertical portion consisting of a lower vertical portion, an upper vertical portion and a horizontal portion intermediate therebetween, said bearing carrying means adapted to rigidly support said arm from having a rotary movement, said arm being adjustable longitudinally upon said rod, and a thumb-screw and guide-stud mounted in said bearing to engage said slot in said rod to secure said arm and bearing in adjusted position, substantially as specified.

15. A talking-machine comprising, in combination with a casing, a conical reproducer-arm and an adjustable support therefor comprising a rod adapted to be secured to said machine-casing, a slot in said rod, a bearing carried by the vertical portion of said support, said vertical portion consisting of a lower vertical portion, an upper vertical portion and a horizontal portion intermediate therebetween, said bearing carrying means adapted to rigidly support said arm from having a rotary movement, said arm being adjustable lon-

gitudinally upon said rod, a thumb-screw and guide-stud mounted in said bearing to engage said slot in said rod to secure and guide said arm and bearing in adjusted position, and an adjustable means mounted upon said horizontal portion of the vertical portion of said support to pivotally support said reproducer-arm, substantially as specified.

16. A talking-machine comprising, in combination with a casing, a conical reproducer-arm and an adjustable support therefor, a horizontal portion of said support carrying adjustable means to pivotally support said reproducer-arm, said reproducer-arm having a joint adjacent to the sound-box to allow said sound-box to be lifted from the record comprising a cylindrical chamber having a cut-away portion, a ring-band which is carried by the coupling carrying said sound-box, said ring-band being also mounted in said chamber, said chamber having threads which engage threads in a cap adapted for closing said joint, means on said arm adjacent to said joint to maintain said sound-box out of engagement with the record, and a cone-shaped stud integral with the rear convexed portion of said reproducer-arm to cooperate with said adjustable means mounted upon said horizontal portion of said support to obtain an adjustable, pivotal movement of said reproducer-arm, substantially as specified.

17. A talking-machine comprising, in combination with the casing and an adjustable support for the reproducer-arm, a coupling mounted upon said support, a horn provided with interlocking lugs, said coupling having an interrupted cam-thread adapted to cooperate with the lugs upon the horn, said coupling having a flange carrying a projection, a collar integral with said support, a cut-away portion in said collar which is adapted to receive said flange and projection and hold said coupling and horn in a pivotal manner, said support comprising a rod adapted to be secured to said machine-casing, a slot in said rod, a bearing carried by the vertical portion of said support, said vertical portion consisting of a lower vertical portion, an upper vertical portion and a horizontal portion intermediate therebetween, said vertical portion being adjustable longitudinally upon said rod, said bearing carrying means adapted to rigidly support said vertical portion of said support from having a rotary movement but at the same time adjustable longitudinally on said rod, said means consisting of a thumb-screw and guide-stud to engage said rod to hold and guide said vertical portion and bearing in adjusted position, substantially as specified.

18. A talking-machine comprising an adjustable support for the reproducer-arm having a joint on said arm to allow the sound-box to be lifted from the record, means adjacent to said joint to hold said sound-box out of engagement with the record, said arm consist-

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ing in combination of a horizontal pivotal portion on one side of said joint, a coupling on the opposite side of said joint, said coupling having a horizontal straight portion which
 5 converges into a quarter-circular curved portion, said straight portion of said coupling being in alinement with said horizontal pivoted portion, and a sound-box carried by the extreme end of said coupling, substantially as
 10 specified.

19. A talking-machine comprising the combination of the casing, a coupling, a conical reproducer-arm, and an adjustable support therefor, comprising a rod adapted to be secured to said machine-casing, a bearing carrying means adapted to rigidly support said
 15 arm from having a rotary movement, said arm being adjustable longitudinally on said rod, a thumb-screw mounted in said bearing to engage said rod to hold said arm and bearing in adjusted position, said coupling having a flange, a bevel upon its lower face thereof, a collar and a slight extension integral with said support which are adapted to receive and hold
 20 said flange and coupling in a pivotal manner, substantially as specified.

20. In a talking-machine, the combination of the casing and an arm having at its rear convex portion a cylindrical hollow extension adapted to receive a cone-shaped pin having a spiral cam-thread, a thumb-screw adapted to engage said spiral cam-thread to allow for vertical adjustment, and means mounted upon
 30 said arm to hold the sound-box out of engagement with the record, substantially as specified.

21. In a talking-machine, the combination of the casing, the conical arm, a joint on said arm to allow the sound-box to be lifted from
 40 the record, said conical arm provided at its rear convex portion with a cone-shaped stud, a screw-threaded stud in which said cone stud bears, said screw-threaded stud having a V-shaped way, a slide therein, an extension integral thereon, a nut on said stud having an inner circumferential groove, with which said extension engages, a support for said threaded stud, a coupling mounted upon said support, a horn provided with interlocking lugs, and
 45 said coupling having an interrupted thread adapted to act in connection with the lugs upon the horn, substantially as shown and described.

22. A talking-machine comprising the combination of the casing, a coupling, the conical
 55 arm and an adjustable support therefor, consisting of a rod having a guide-slot therein which is adapted to be secured to said machine-casing, a bearing carrying means adapted to rigidly support said arm from having a rotary
 60 movement, said arm being adjustable longitudinally on said rod, a thumb-screw mounted in said bearing to engage said rod to hold said arm and bearing in adjusted position, said coupling having a flange carrying
 65 a projection, a collar integral with said support and a cut-away portion in said collar which is adapted to receive said flange and projection and hold said coupling in a pivotal manner, substantially as specified. 70

23. In a talking-machine, the combination of the casing, the conical arm, a joint on said arm to allow the sound-box to be lifted from the record, said joint comprising a chamber, a ring-band located therein, caps for closing
 75 said joint, and said ring-band being made detachable with the coupling carrying the sound-box, means mounted upon said arm for holding said sound-box out of engagement with the record and adjustable means at the rear
 80 convex portion of said arm to allow said arm to be adjusted vertically, substantially as specified.

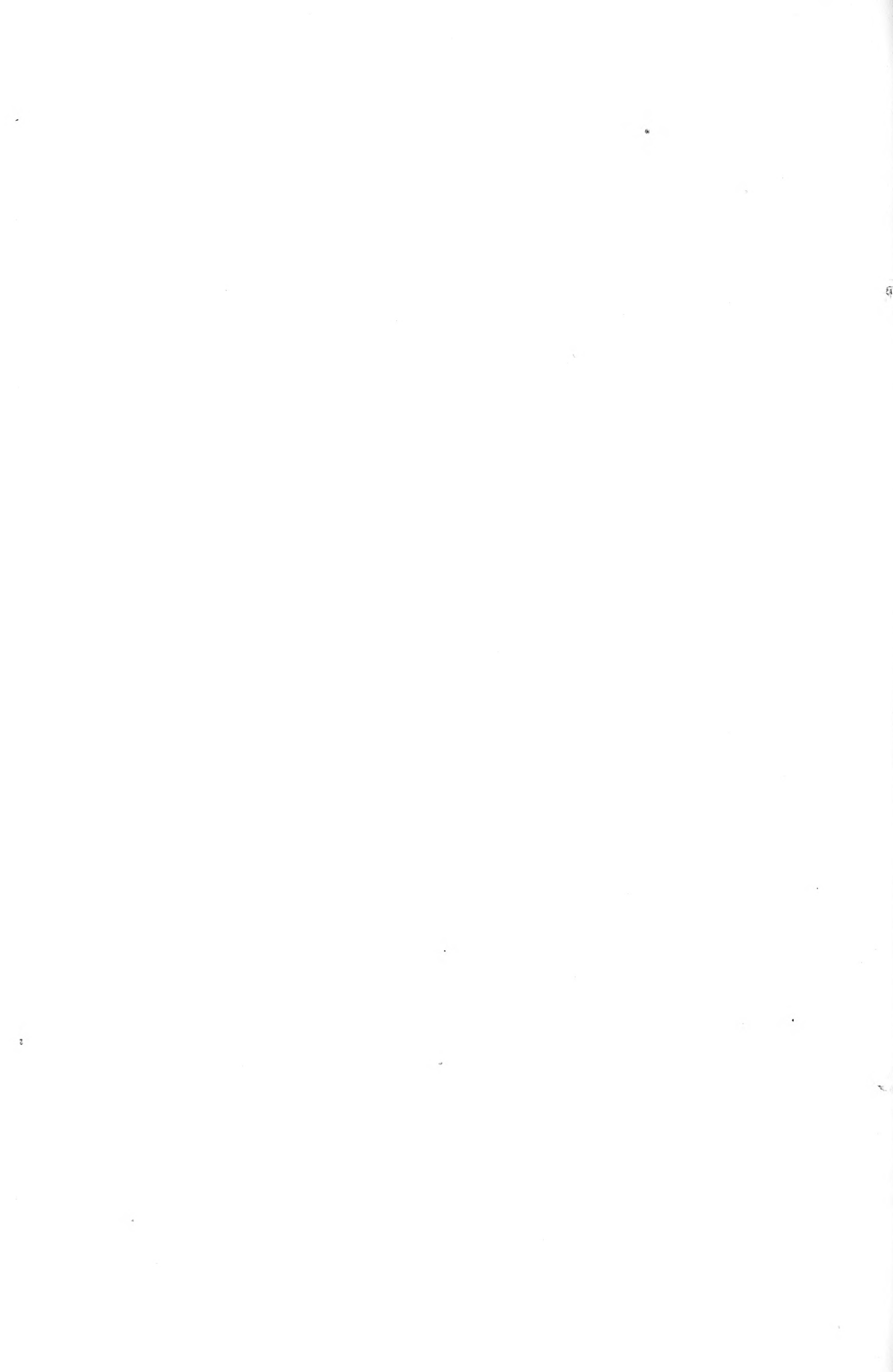
24. A talking-machine having a conical reproducing-arm having a joint on the arm near
 85 the sound-box to allow the sound-box to be raised from the record, consisting of a cylindrical shell opened at one end and closed at the other, a flanged internally-threaded cover adapted for closing said exteriorly-threaded
 90 opening, a ring-band which has brazed across its diameter the straight portion of a coupling carrying the sound-box, said ring-band being placed inside of said shell for a free movement therein, a cut-away portion in the cylindrical
 95 wall of said shell which when closed by said flanged cover will form a slot in the joint of the arm to allow the straight portion of the coupling and the ring-band to have a free movement therein, substantially as specified. 100

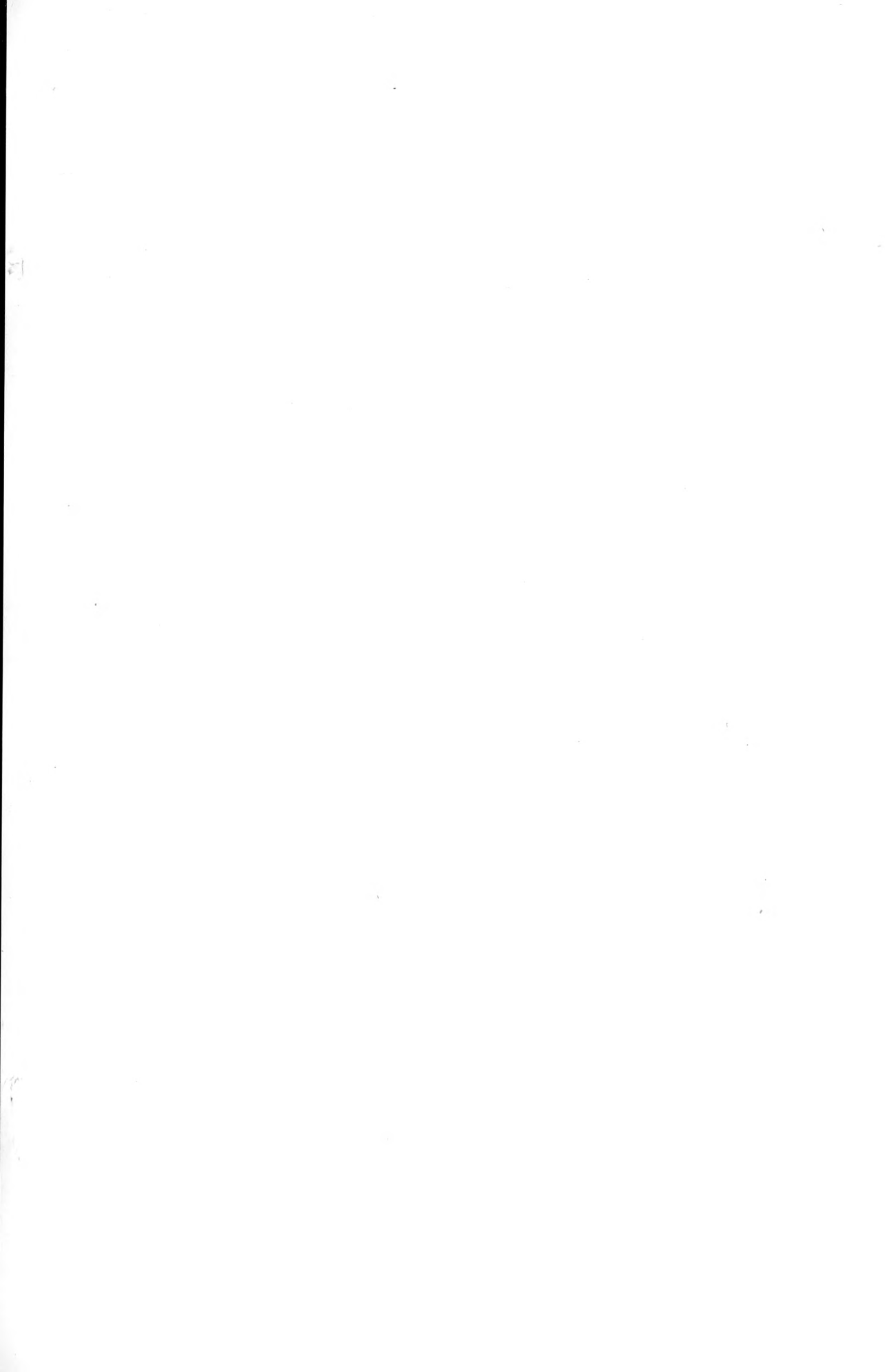
In testimony whereof I affix my signature in presence of two witnesses.

HARRY B. McNULTY.

Witnesses:

HERBERT C. EMERY,
 E. M. DUNBAR.





No. 776,941.

PATENTED DEC. 6, 1904.

J. K. REYNARD.
CONVERTIBLE SOUND BOX.
APPLICATION FILED AUG. 19, 1903.

NO MODEL.

Fig.1

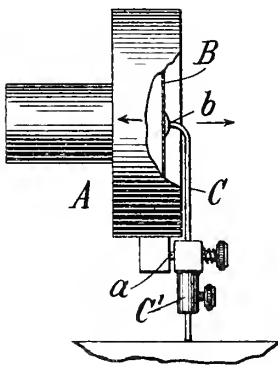


Fig.2

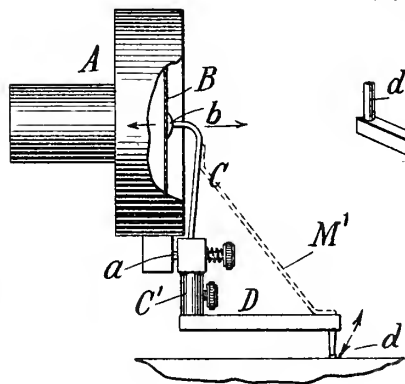
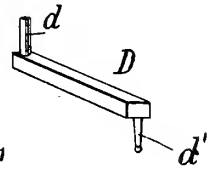


Fig.3



Witnesses:
Raphael Ketter
Wm D. Kerkaue

James K. Reynard, Inventor
Mauro Cameron Lewis,
by *Attys*

UNITED STATES PATENT OFFICE.

JAMES K. REYNARD, OF NEW YORK, N. Y.

CONVERTIBLE SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 776,941, dated December 6, 1904.

Application filed August 19, 1903. Serial No. 170,095. No model.

To all whom it may concern:

Be it known that I, JAMES K. REYNARD, of New York city, State of New York, have invented a new and useful Convertible Sound-Box, which improvement is fully set forth in the following specification.

My invention relates to reproducing devices or "sound-boxes" for disk sound-records in which the irregularities representing sound-waves consist of vertical undulations on the bottom of the record-grooves instead of lateral undulations on the sides. This latter is the form of disk record now on the market. One feature of my device consists of means for adapting the present sound-box (intended for use with the latter type) for use with the first-named type. In the present construction, with latterly-undulated sound-grooves of uniform depth, the sound-box is so mounted that its diaphragm lies in a vertical plane at right angles to the horizontal record-disk and will vibrate to and fro in a horizontal direction, and the lateral (horizontal) vibrations given to the stylus-point by the lateral undulations of the record-groove are transmitted by the simple leverage of the stylus-bar into horizontal vibrations of the diaphragm.

In order to obtain a reproduction from a vertically-undulated record-groove, either the diaphragm must be turned down so as to lie parallel with the record-tablet, so that it may vibrate vertically in correspondence with the vertical vibrations imparted to the stylus-point or (if the diaphragm be retained in its present arrangement) some means must be devised for the purpose of translating the vertical vibrations imparted to the stylus-point into horizontal vibrations when they reach the diaphragm.

There are now in the hands of the public and on the market a great number of disk talking-machines constructed and arranged to hold the sound-box so that its diaphragm shall be at right angles to the tablet, which I shall call the "standard" type of machine.

One object of my present invention is to provide that without alteration or reorganization of the standard type of machine the same sound-box may be used to reproduce from the

new records of varying depth. I accomplish this either by adding a small attachment to the sound-boxes already in use or by making a slight change in the present construction of the sound-box.

The invention will best be understood by reference to the accompanying drawings, that illustrate without limiting it.

Figure 1 represents conventionally the present type of vertically-arranged sound-box. Fig. 2 shows the same with my attachment in place, and Fig. 3 is a perspective of the attachment.

A is the sound-box, and B its diaphragm. The stylus-lever C is connected to the latter at *b*, carries the removable needle *c* in the usual barrel C', and is fulcrumed at *a*. The portion *b* of the diaphragm is free to vibrate to and fro in the horizontal line indicated by the arrows, while the needle-point *c* is caused to vibrate in the (substantially) horizontal line (really a short arc, whose center is fulcrum *a*) also indicated by arrows in Fig. 1.

D is my new attachment, consisting of a bar or block of metal having the stud *d* projecting upward at right angles from near one end and the stylus-point *d'* projecting downward at right angles from the opposite side near the opposite end. Stud *d* is adapted to be secured in the barrel C' in place of stylus *c*. The effect of this offset attachment is to throw the new stylus-point *d'* considerably to one side of the line between portion *b* of the diaphragm and fulcrum-point *a*, so that its vibrations swing in the indicated arc (whose center is point *a*) in approximately a vertical direction, so that vertical impulses given to point *d'* are translated into horizontal vibrations of point *b*, (and of the entire diaphragm.) Thus by means of my device D the very same machine and sound-box can reproduce alternately zigzag records and the new vertical records. The farther to one side stylus-point *d'* is placed within the limits of efficiency the better. Preferably the distance from fulcrum *a* should about equal the distance from *a* to *b*.

The idea is to offset or project the stylus-point as far as convenient away from the line

defined by points *b* and *c*, so as to produce, in effect, a sort of elbow or bell-crank lever. There may be also a brace *M'* in either modification, though this may be omitted.

5 Having thus described my invention and the simplest forms of carrying it out, I claim—

1. The combination with a sound-box, a diaphragm therefor arranged to vibrate horizontally, a stylus-bar attached to said diaphragm, and the usual needle-receiving barrel at the free end of said stylus-bar, of a device secured in said barrel and extending at right angles to said diaphragm and bar, and a stylus extending downwardly at right angles from the free end of said device.

2. An attachment for substitution in place of the needle of an ordinary zigzag-disk-record sound-box, the said attachment consisting of a bar carrying a stylus projecting at right angles from one end thereof and a stud extending in the opposite direction from the other

end thereof, said stud adapted to be inserted and held in the needle-seat of said sound-box.

3. The herein-described convertible sound-box adapted to ready adjustment for reproduction from either laterally-undulating or vertically-undulating record-grooves, the same comprising a horizontally-vibrating diaphragm, a stylus-bar connected thereto, a detachable device carried by said stylus-bar and extending horizontally therefrom at right angles from the diaphragm, and a stylus depending at right angles from the outer end of said device.

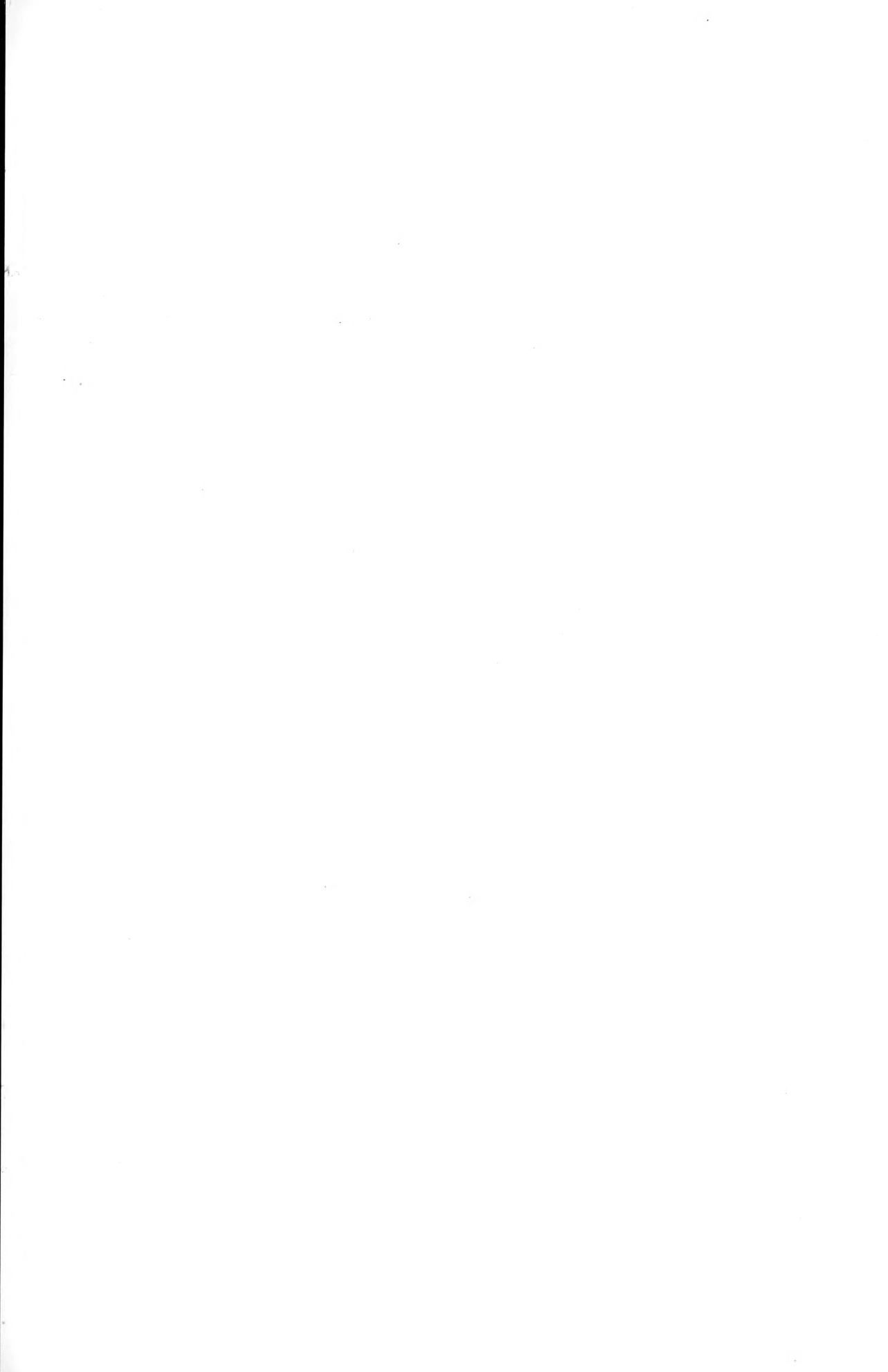
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JAMES K. REYNARD.

Witnesses:

C. A. L. MASSIE,

O. R. JUDD.



C. J. RAWLINSON.
PHONOGRAPH, GRAPHOPHONE, &c.
APPLICATION FILED MAY 21, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

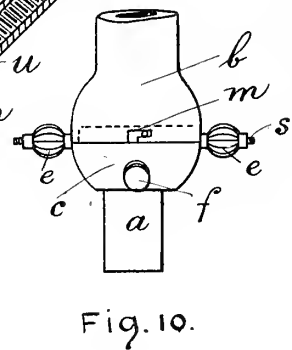
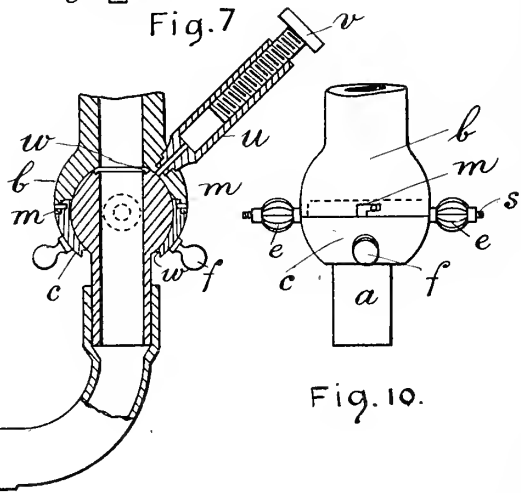
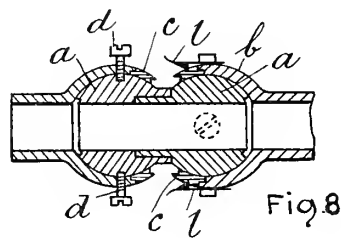
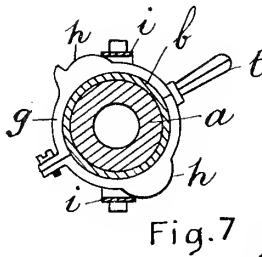
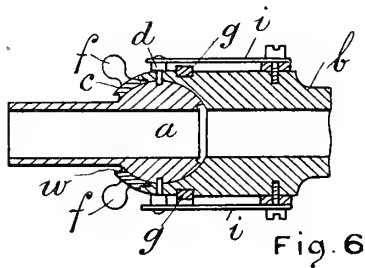
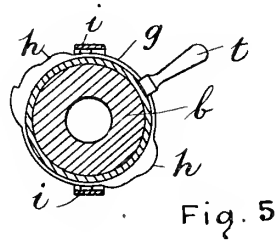
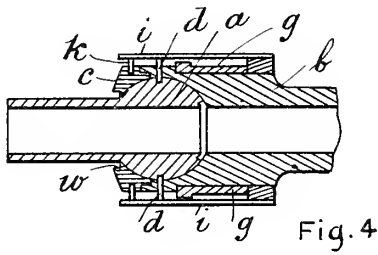
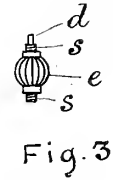
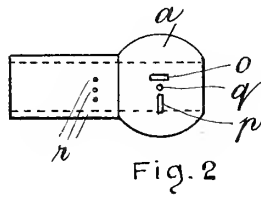
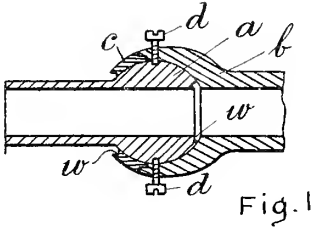


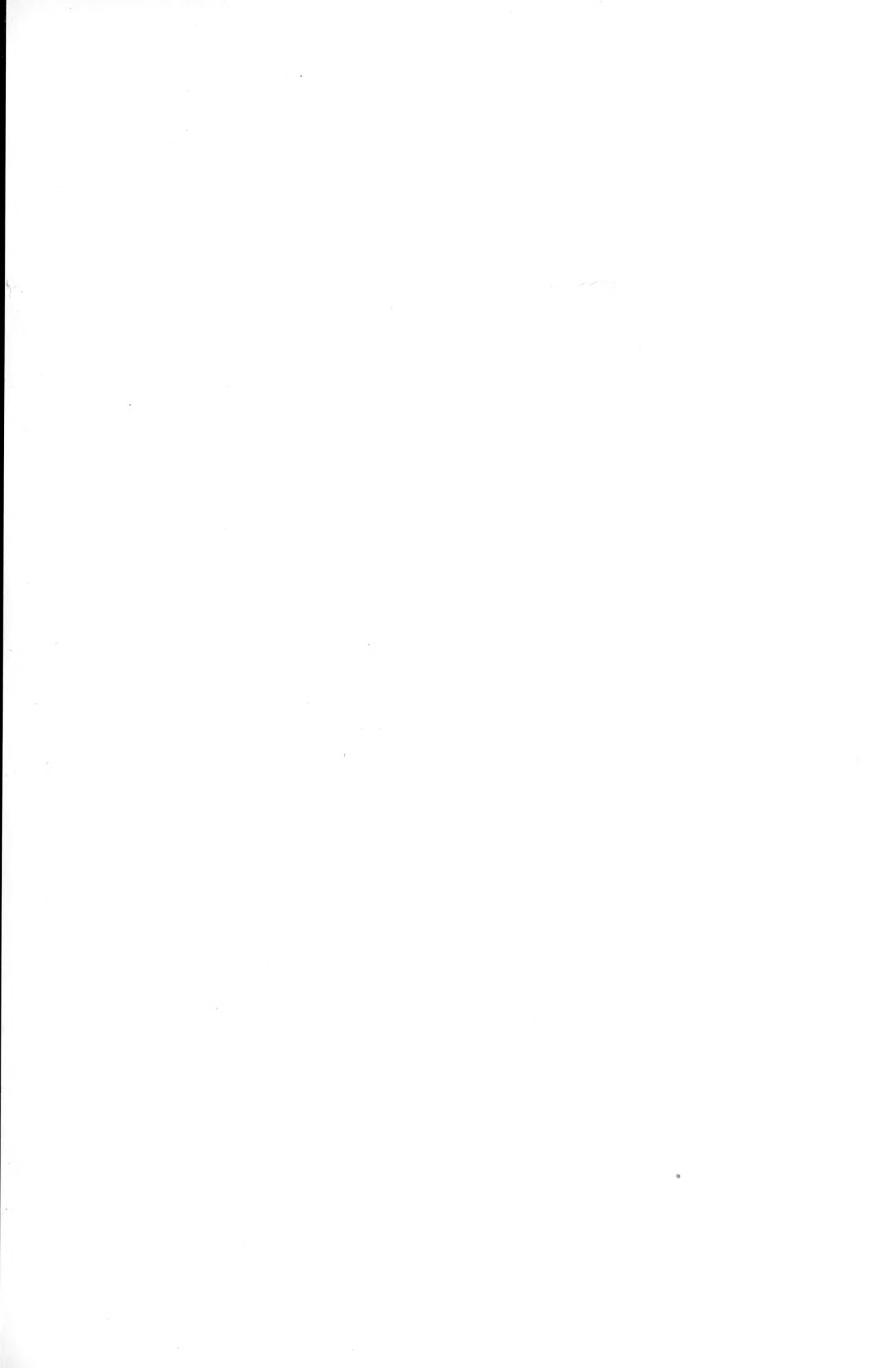
Fig. 9

Witnesses

Charles Septimus Periton
Herbert D Jameson

Inventor

Clair James Rawlinson



C. J. RAWLINSON.
PHONOGRAPH, GRAPHOPHONE, &c.

APPLICATION FILED MAY 21, 1904.

NO MODEL.

2 SHEETS—SHEET 2.

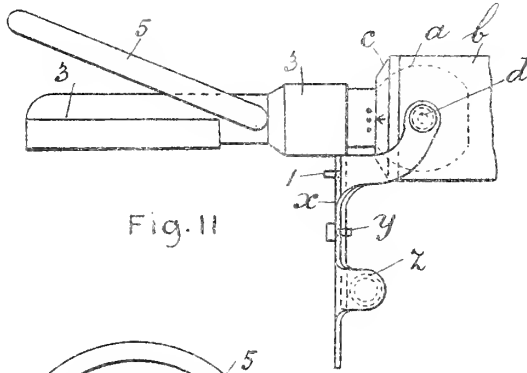


Fig. 11

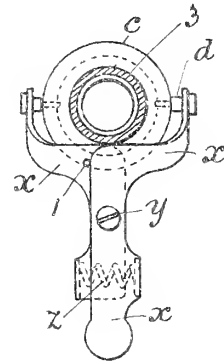


Fig. 13

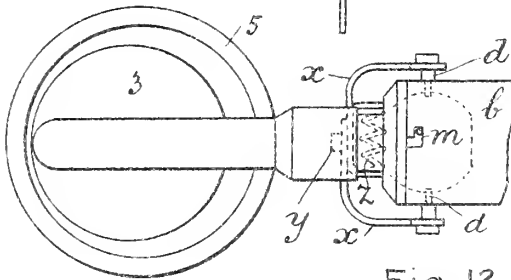


Fig. 12.

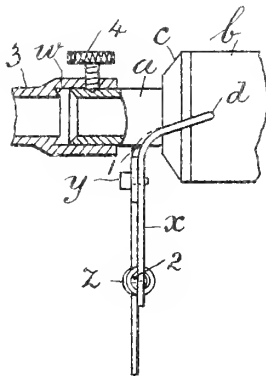


Fig. 14.

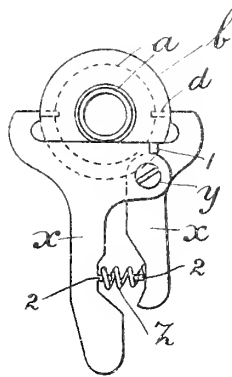


Fig. 15.

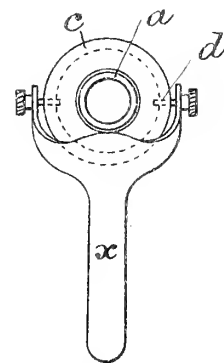


Fig. 16

Witnesses

Charles Septimus Reith
Herbert D. Jameson

Inventor

Clair James Rawlinson

UNITED STATES PATENT OFFICE.

CLAIR JAMES RAWLINSON, OF LONDON, ENGLAND.

PHONOGRAPH, GRAPHOPHONE, &c.

SPECIFICATION forming part of Letters Patent No. 777,306, dated December 13, 1904.

Application filed May 21, 1904. Serial No. 209,080. (No model.)

To all whom it may concern:

Be it known that I, CLAIR JAMES RAWLINSON, engineer, a subject of the King of Great Britain, residing at London, England, have invented certain new and useful Improvements in and Relating to Phonographs, Graphophones, and Like Sound-Recording Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in and connected with joints for forming flexible connection between the diaphragm and the trumpet in phonographs, graphophones, and other sound-recording or sound-producing instruments; and it consists of the construction, arrangement, and combination of parts hereinafter described, and particularly pointed out in the claims.

In order that my invention may be better understood, I will now describe the same with reference to the drawings, in which—

Figure 1 is a longitudinal sectional view of one form of the invention. Fig. 2 is a view of the ball part of the joint. Fig. 3 is a view of one of the pivot-pins. Figs. 4 and 5 show a longitudinal section and a cross-section of a modification. Figs. 6 and 7 are like views of a further modification. Fig. 8 is a longitudinal sectional view of another modification. Fig. 9 is a section showing a lubricating arrangement. Fig. 10 is an elevation of Fig. 9. Fig. 11 is a side view showing the operating-lever and the weight 5. Fig. 12 is a plan thereof. Fig. 13 is a cross-section through the center of Fig. 11. Figs. 14, 15, and 16 are modified forms of levers.

The ball *a* is inclosed in the cup or socket *b* and is retained therein by means of the keep-ring *c*, which with the socket *b* completes the ball-chamber. The keep-rings may be retained in position either by accuracy of fit, as in Fig. 1, by means of the spring-controlled keep-pins *k*, as in Fig. 4, may be screwed direct to the ball-chamber, as in Fig. 6, may be held in position by spring-clips *l*, as in Fig. 8, or by means of the bayonet-joint *m*, as shown in Figs. 9 and 10. The knobs *f* are to facilitate the attaching or detaching of the

said keep-ring. The movement of the ball within the socket is limited by the pivot-pins *d*, one of such pivot-pins being on each side of the socket, the pivot-pin points entering longitudinal or transverse slots or recesses *e* and *p*, formed in the surface of the ball *a*, as shown in Fig. 2, such slots or recesses being respectively opposite one another, or if motion in one direction only is required—for example, when making records—the points of the pivot-pins are transferred to the plain holes *q*, or I may bore the plain hole *q* in the bottom of one of the slots or recesses *e* or *p*. The neck of the ball is provided with marks *r* to indicate the position of the slots and plain holes. The pivot-pins may be formed as shown in Fig. 3, *d* being the point, *e* the milled body, and *s* the screwed ends, one end only being provided with a point *d*. The plain end is screwed into the holes in socket when no pivot-pin point is required.

I may employ spring-controlled pivot-pins, as shown in Figs. 4 and 6. One end of the spring *i* is fixed to the prolongation of the ball-chamber *b*. The opposite end of the spring, carrying the pivot-pin *d*, retains the same within the slot or hole in the ball-surface. The ball-chamber is provided with a rotatable cam-ring *g*, as in Figs. 4, 5, 6, and 7, having cams or projections *h* thereon. By moving the handle *t* the ring is rotated, the cams or projections *h* forcing the springs *i* apart, and thus withdraw the points of the pivot-pins clear of the slots or holes, enabling the ball to be shifted. The springs *i* may also carry the keep-pins *k* for retaining the keep-ring *c* in position, (see Fig. 4.) and the rotatable cam-ring is provided with projections of various heights. By turning the handle *t* so that the first projection comes into contact with the springs *i* the pivot-pins are withdrawn. A further turn brings a higher projection into contact with the springs *i*, forcing them farther apart, withdrawing the keep-pins *k*.

In the modification shown in Fig. 8 a double ball is employed, one ball giving motion in one desired direction and the other ball giving motion in the other desired direction. The ball-casing *b*, Fig. 9, is provided with a lubricator or lubricant-reservoir *u*, closed by a screwed lid *v*. By screwing in this lid the

lubricant is forced into the joint. The capillary ducts *w w* retain the lubricant within the joint by capillary attraction.

In order that the recorder or diaphragm
 5 may be lifted clear of the recording-cylinder
 or record, I employ the lifting-lever *x*, piv-
 10 50 15 20 25 30 35 40 45 50 55 60
 60 3. Weight is added by forcing the ring 5
 over the diaphragm or may be decreased by
 turning the ring away from the diaphragm.

I claim—

1. A joint for a graphophone consisting of
 65 a portion having a ball-shaped end, having a

number of slots and holes therein, a portion
 having a cup-shaped end forming a socket, a
 keep-ring connected to said cup-shaped por-
 tion and pins carried in said cup-shaped por-
 tion engaging with the holes and slots in the
 ball-shaped portion, said ball-shaped portion
 also carrying indicating-marks, substantially
 as described. 70

2. A joint for a graphophone consisting of
 a portion having a ball-shaped end and having
 a number of slots and holes therein, a portion
 having a cup-shaped end forming socket for
 said ball-shaped end, a keep-ring connected to
 the cup-shaped portion, oil-ducts therein, pins
 carried in said cup-shaped portion engaging
 with the slots in the ball-shaped portion, and
 a weight-regulating device, substantially as
 described. 75 80

3. A joint for a graphophone consisting of
 a ball and socket, pins carried by the socket
 portion, a keep-ring connected to the socket
 portion the ball portion having slots and holes
 therein in which the pins engage and having
 also indicating-marks thereon and a lifting-
 lever connected to said joint. 85 90

4. A joint for a graphophone consisting of
 a ball and socket, pins carried by the socket
 portion, a keep-ring connected to the socket
 portion the ball portion having slots and holes
 therein in which the pins engage and having
 also indicating-marks thereon and a hinged
 and spring-urged lifting-lever connected to
 said joint. 95

5. A joint for graphophones and the like
 consisting of ball and socket portions, a keep-
 ring on the socket portion having oil-ducts
 therein and reversible pivot-pins on said socket
 portion said ball portion having slots and holes
 therein in which the pivots engage. 100

6. A joint of the class described consisting
 of ball and socket portions, a keep-ring on
 said socket portion having oil-ducts therein,
 spring-urged pivot-pins on said socket por-
 tion, and a rotatable cam-ring for operating
 the same, said ball portion having slots and
 holes in which the pins are adapted to engage
 said ball portion also having indicating-marks
 thereon. 105 110

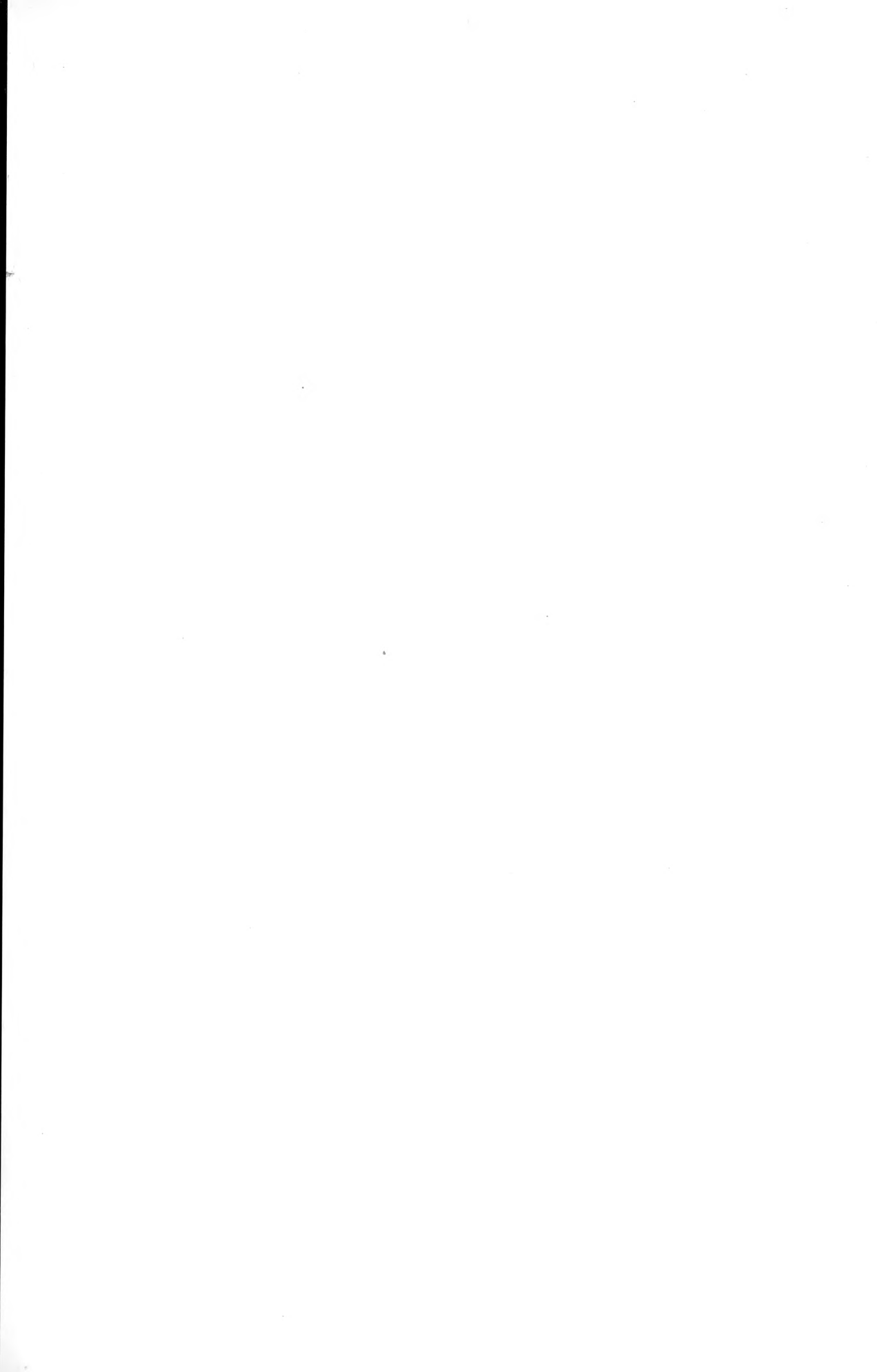
7. A joint of the class described, consisting
 of ball and socket portions, a keep-ring on
 said socket portion having oil-ducts therein,
 pins for holding said rings in place, springs
 connected to the socket portion, pivot-pins
 carried by said springs and a rotatable cam-
 ring operating the keep-ring, said ball por-
 tion having holes and slots therein in which
 the pivot-pins are adapted to engage and also
 having indicating-marks thereon. 115 120

In witness whereof I have hereunto set my
 hand in presence of two witnesses.

CLAIR JAMES RAWLINSON.

Witnesses:

CHARLES SEPTIMUS BERTHON,
 HERBERT D. JAMESON.



No. 777,615.

PATENTED DEC. 13, 1904.

V. H. EMERSON.
CONVERTIBLE SOUND BOX.
APPLICATION FILED AUG. 19, 1903.

NO MODEL.

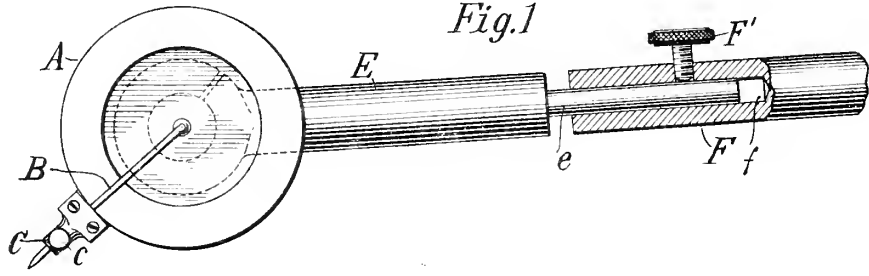


Fig. 1

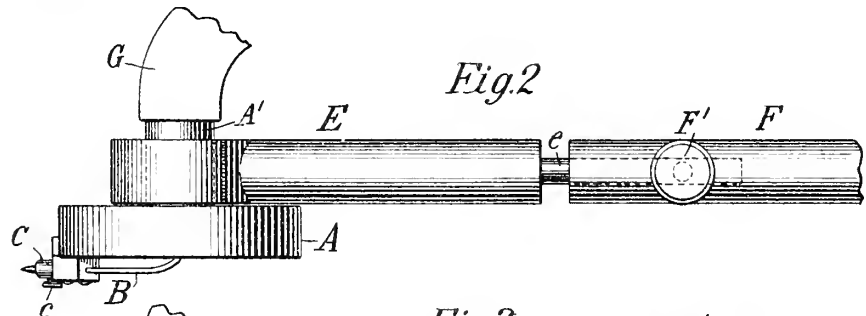


Fig. 2

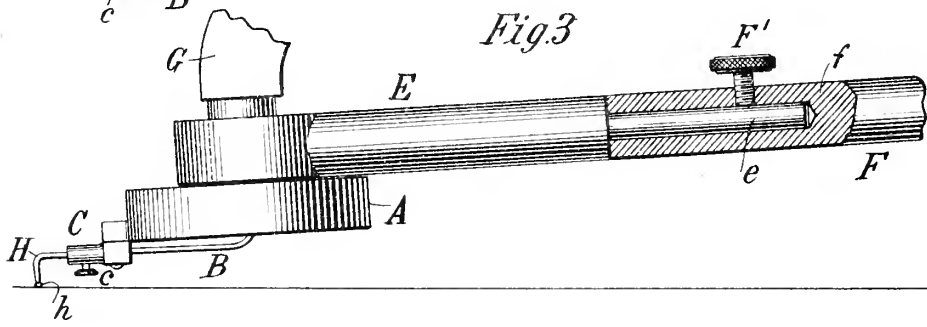


Fig. 3

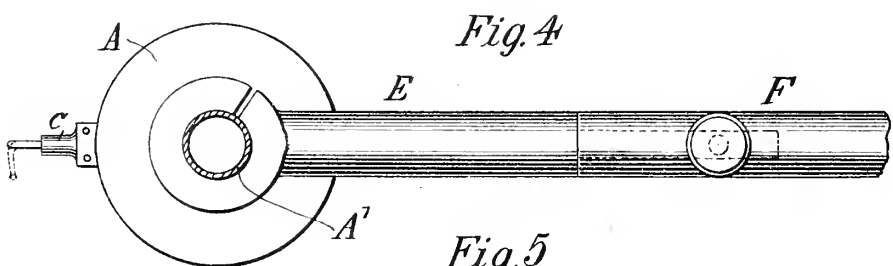


Fig. 4

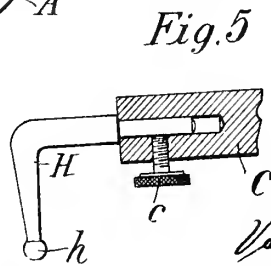


Fig. 5

Witnesses:
Raphael Ketter
H. B. Herkam

Victor H. Emerson, Inventor
Mauro Cameron Lewis,
by *Attys.*

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEWARK, NEW JERSEY, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

CONVERTIBLE SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 777,615, dated December 13, 1904.

Application filed August 19, 1903. Serial No. 170,089. (No model.)

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, of Newark, New Jersey, have invented a new and useful Convertible Sound-Box, which improvement is fully set forth in the following specification.

This invention relates to disk talking-machines in which the sound-box, with its diaphragm and reproducing-stylus, is carried by a swinging arm pivoted some distance away from the turn-table and is fed across the disk by the record-groove itself. The sound-records commonly employed with this type of machine contain the record-groove in the form of grooves of uniform depth containing lateral undulations corresponding to the sound-waves. The sound-box is arranged so that its diaphragm is at right angles to the disk—that is, vertical. Another form of sound-record contains the record in the form of a groove of varying depth, the irregularities consisting of vertical undulations corresponding to sound-waves. The first-mentioned records are conveniently spoken of as “zigzag” records. The other type I shall refer to as “up and down” or “vertical.”

The object of the present invention is to adapt a talking-machine for reproducing from records of either type.

The invention consists in providing means for supporting the sound-box interchangeably, so that its diaphragm may lie either practically parallel with the record-disk or at right angles thereto and in adding a small attachment in place of the ordinary needle.

The invention will be best understood by referring to the accompanying drawings, that illustrate one embodiment thereof.

Figure 1 is a side view of a preferred form of apparatus, partly in section, showing the sound-box arranged for reproducing from zigzag records. Fig. 2 is a top view of the same. Fig. 3 is a side view, partly in section, showing the apparatus arranged for reproducing from up-and-down records; and Fig. 4 is a top view of the same. Fig. 5 is a detail.

A represents the sound-box of any ordinary or preferred construction, having the stylus-bar B fulcrumed thereon and carrying at its free end the barrel C, with set-screw *c*, for engaging the ordinary needle-point D. The swinging arm is made in two sections E and F. Section E has the usual split ring for engaging the stem A' of the sound-box, which latter carries the usual elbow G. Section F has a cylindrical seat *f* for engaging a cylindrical stem *e*, projecting from section E. A set-screw F' holds the section E in any desired adjustment.

H represents an L-shaped or angular device carrying a reproducing-stylus *h* at one end and adapted to be inserted in the barrel C in place of the needle. Figs. 1 and 2 represent the arrangement in reproducing from the present well-known form of zigzag records. The set-screw F' holds the sections E and F rigidly, and the device operates in the well-known manner.

To obtain the adjustment shown by Figs. 3 and 4, first loosen the set-screw *c* and remove the needle, then insert attachment H so that the stylus-point *h* will extend in the opposite direction from stem A', and clamp it thus with set-screw *c*; second, rotate the sound-box in the split ring of section E so that it will occupy the position shown in Fig. 4 instead of the position indicated by the dotted lines H'; third, loosen set-screw F', turn section E on its axis through an angle of ninety degrees, then push it into its socket *f* until stylus-point *h* has the proper position, and then clamp set-screw F'. In this adjustment the vertical undulations of the record-groove impart vertical vibrations to the stylus *h*, which are then translated into corresponding vertical vibrations of the diaphragm.

Changes may be made in the construction and details of the parts without departing from the spirit of my invention.

Having thus fully described a preferred manner of carrying out my invention, I claim—
1. In a talking-machine, a sound-box therefor having a barrel for receiving the needle,

a swinging arm for carrying said sound-box and made in two sections for adjusting said sound-box, and an angular stylus attachment adapted to be inserted in said barrel.

5 2. The combination with a sound-box, of an L-shaped stylus attachment removably secured thereto, and means for holding said sound-box either horizontally or vertically.

10 3. The combination of a sound-box and means for supporting it interchangeably with its diaphragm either parallel to or at right angles to the surface of the sound-record.

15 4. The combination with a sound-box, of means for supporting it interchangeably with its face either parallel to or at right angles to the record-disk, and a detachable L-shaped

device carrying the reproducer-point and secured in place of the ordinary needle.

5. The combination with a sound-box and its diaphragm, of supporting means therefor 20 that holds said diaphragm in operative position for a laterally-vibrating stylus, said means being adjustable to present said diaphragm in another position operative for a vertically-vibrating stylus. 25

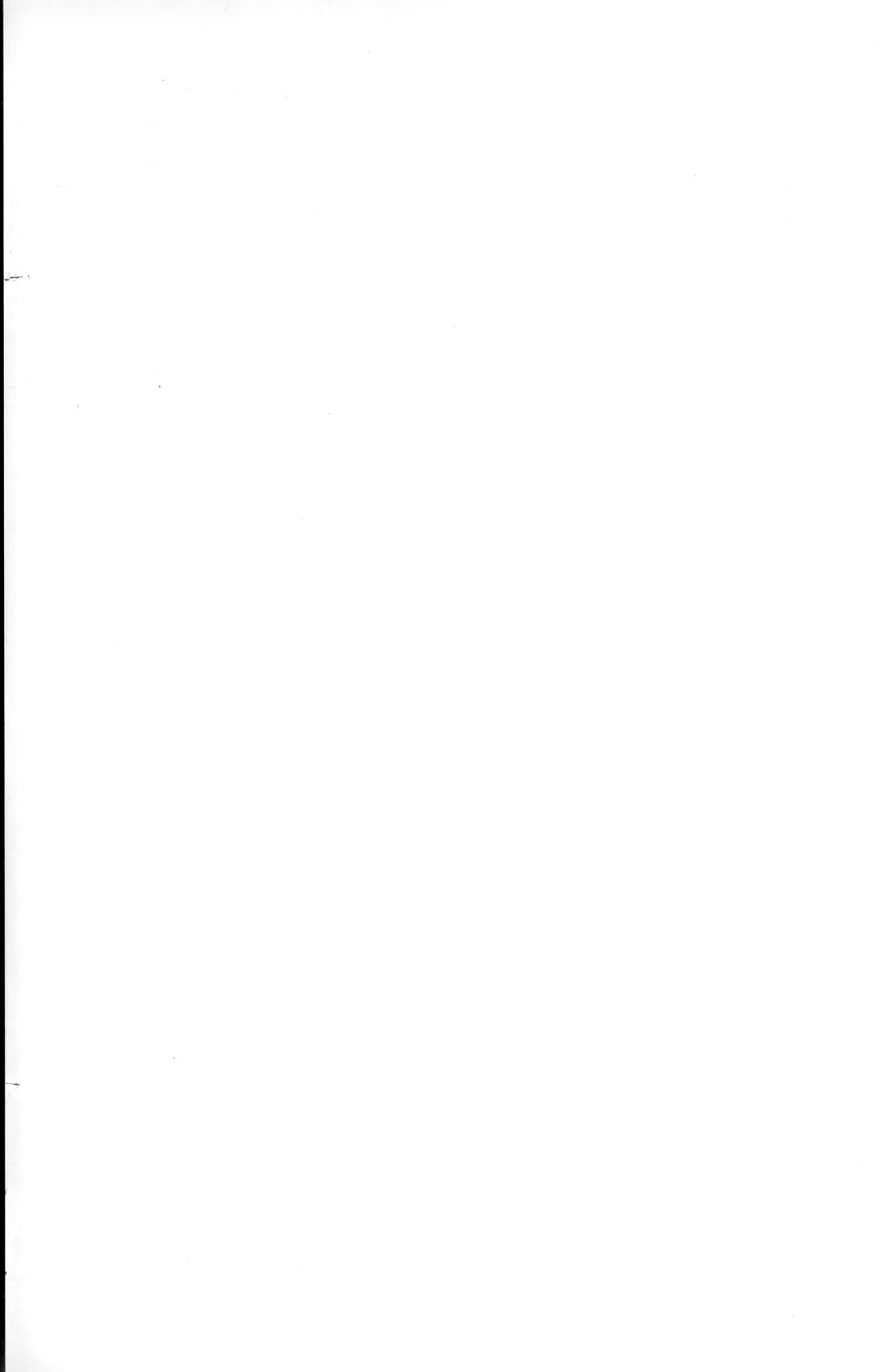
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

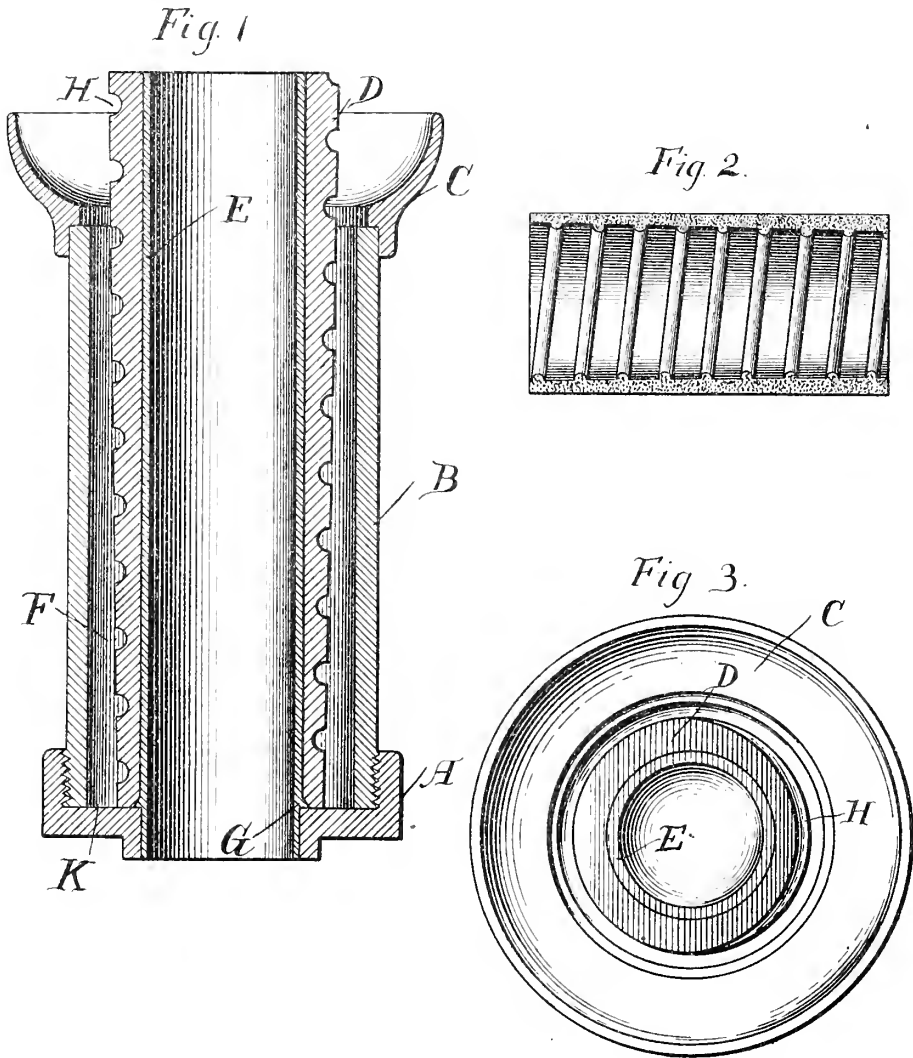
C. A. L. MASSIE,

O. R. JUDD.



A. HAUG.
PROCESS OF MAKING PHONOGRAPH CYLINDERS.
APPLICATION FILED OCT. 6, 1902.

NO MODEL.



Witnesses
Grace A. Grimmond
Herbert Kuehly.

Andrew Haug
Inventor
By his Attorney Louis H. Hike

UNITED STATES PATENT OFFICE.

ANDREW HAUG, OF WEST ORANGE, NEW JERSEY.

PROCESS OF MAKING PHONOGRAPH-CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 777,629, dated December 13, 1904.

Application filed October 6, 1902. Serial No. 126,080. (No model.)

To all whom it may concern:

Be it known that I, ANDREW HAUG, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented new and useful Improvements in the Manufacture of Phonograms and in Phonograms, of which the following is a specification.

This invention relates to the process of manufacturing phonograms by molding and to phonograms thus manufactured, and has for its object to render the process more expeditious and cheaper and the phonogram thus manufactured better.

Heretofore in the manufacture of phonograms by molding heat and cold have not been applied by immersion of the mold at the inner surface of the phonogram, and when the phonogram, which is cylindrical in shape and hollow, has been taken from the mold it has heretofore been necessary to place it upon a reamer in order to shape, to finish or dress, and to give the proper size to the bore of the phonogram-cylinder, especially for the purpose of causing it to fit upon the mandrel of the phonograph.

I have discovered that in the manufacture of phonograms, by the application of heat and cold by immersion of the mold at the inner surface of the phonogram-cylinder during the process of manufacture by molding, a hollow cylindrical phonogram can be more quickly and more economically produced having a bore of proper shape and of proper size and of finished surface which will fit upon the mandrel of the phonograph and that heat and cold can be applied at the inner surface of the phonogram-cylinder during the process of manufacture by molding by the following method, illustrated in the drawings, which gives very satisfactory results.

Figure 1 represents a vertical section of a mold for casting phonogram-cylinders according to my invention. Fig. 2 shows the inner surface of a phonogram molded according to my process. Fig. 3 is a top view of the mold shown in Fig. 1.

The bottom piece A is the base of the mold.

B is a hollow cylinder which is screwed into the base A.

C is a rim which sets on the tube or cylinder B.

D is the core of the mold and is hollow. The core D is preferably recessed at the bottom, as at G, in order to make the parts at that point fit tightly and prevent the heated liquid wax from entering between the core D and the inner tube E, which projects into the recess at G. Into the ring of the base A of the mold the hollow cylindrical inner tube E fits and serves to guide the core D when it is inserted into or withdrawn from the other parts of the mold and to keep the core D when inserted and in place concentric with the outer cylinder B. On the outer surface of the core D there is preferably a spiral groove H or other hollow for the formation of ribs or projections upon the inner surface of the molded phonogram.

F is the matrix or cavity of the mold into which the molten material from which the phonogram is to be molded enters. The outer surface of the matrix F is cylindrical; but the inner surface of the matrix F is preferably tapering like the surface of a cone.

An important feature of the mold shown in Fig. 1 and of my invention is that the core D and the cylinder E are hollow, thereby permitting the entrance by immersion of the mold of a medium for the application of heat or cold at the inner surface of the phonogram-cylinder during the process of manufacture by molding. The core D is preferably higher than the cylinder B. The lower end K of the matrix F may be so shaped that the phonogram when molded will have at that end the shape desired. Upon the inner surface L of the cylinder B a metallic negative of a phonograph-record to be reproduced upon the phonogram to be molded may be placed.

The parts of the mold are made of brass or other suitable material.

In the manufacture of phonograms according to the process of my invention the mold above described and shown in Fig. 1 may be lowered into the molten wax or other mate-

rial from which the phonogram is to be molded until the molten material pours over the rim C into the matrix F and fills the cavity to the desired height. A surplus of molten material is preferably permitted to enter the rim C in order that it may make up for shrinkage of the molten material in the matrix F upon cooling. As the mold is lowered, as above described, into the molten material to permit the molten material to pour into the matrix F the molten material rises in the hollow cylinder E within the core D and communicates its heat through the cylinder E and the core D to the inner surface of the molten material filling the matrix F just as the molten material through the cylinder B communicates its heat to the outer surface of the molten material filling the matrix F. The result of heating the inner surface of the molten material filling the matrix F is to make and keep the molten material thoroughly liquid and enable it to penetrate and fill completely the space of the matrix. By the method described the heating is quickly accomplished.

In order to cool off the mold and the molten material in the matrix F, the mold is now lowered into cold water or other suitable cooling material. Since the water rises in the hollow cylinder E as the mold is lowered into the water, cold is quickly communicated to the inner surface of the molten material filling the matrix F just as it is communicated to the outer surface. The result is that the molten material filling the matrix F cools quickly and the core D can be extracted from the bore of the molded phonogram, leaving a

bore of proper shape and of proper size and of finished surface which will fit upon the mandrel of the phonograph.

What I claim is—

1. The process of making phonograph-cylinders that consists of introducing molten material into a mold having a hollow core, and applying heat to the inner surface of said core, substantially as described.

2. The process of making phonograph-cylinders that consists of introducing molten material into a mold having a hollow core, and applying heat to the inner surface of said core by immersion of the mold, substantially as described.

3. The process of making phonograph-cylinders that consists of introducing molten material into a mold having a hollow core, and applying heat and cold successively to the inner surface of said core, substantially as described.

4. The process of making phonograph-cylinders that consists of introducing molten material into a mold having a hollow core, and applying heat and cold successively to the inner surface of said core by immersion of the mold, substantially as described.

In testimony whereof I have signed my name to this specification, this 30th day of September, 1902, in the presence of two subscribing witnesses.

ANDREW HAUG.

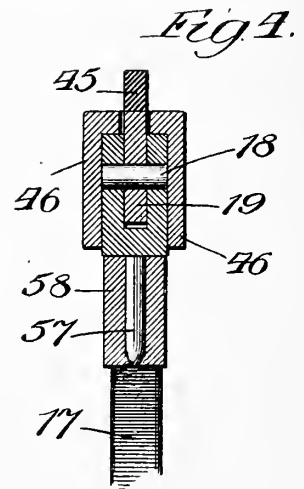
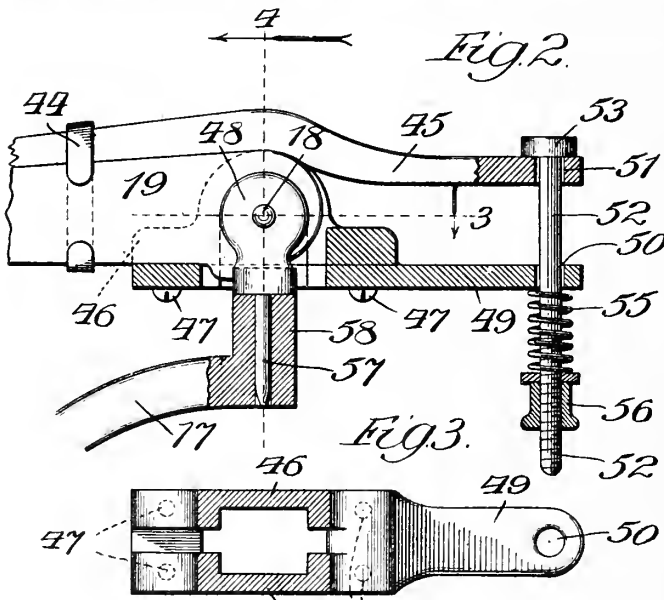
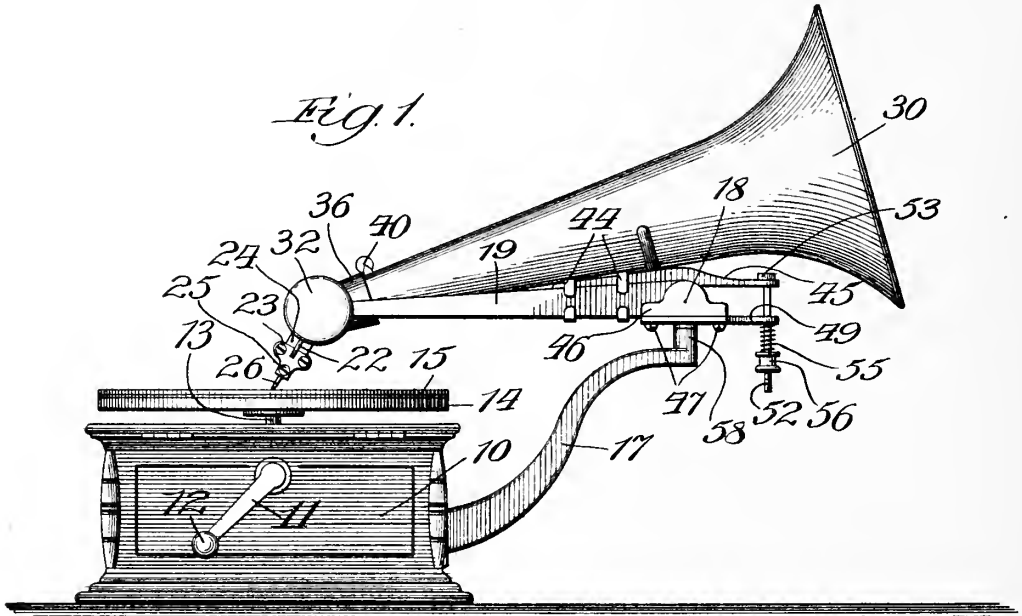
Witnesses:

DANIEL A. DUGAN,
EDWIN FORREST.

E. M. ROBINSON.
PHONOGRAPH.

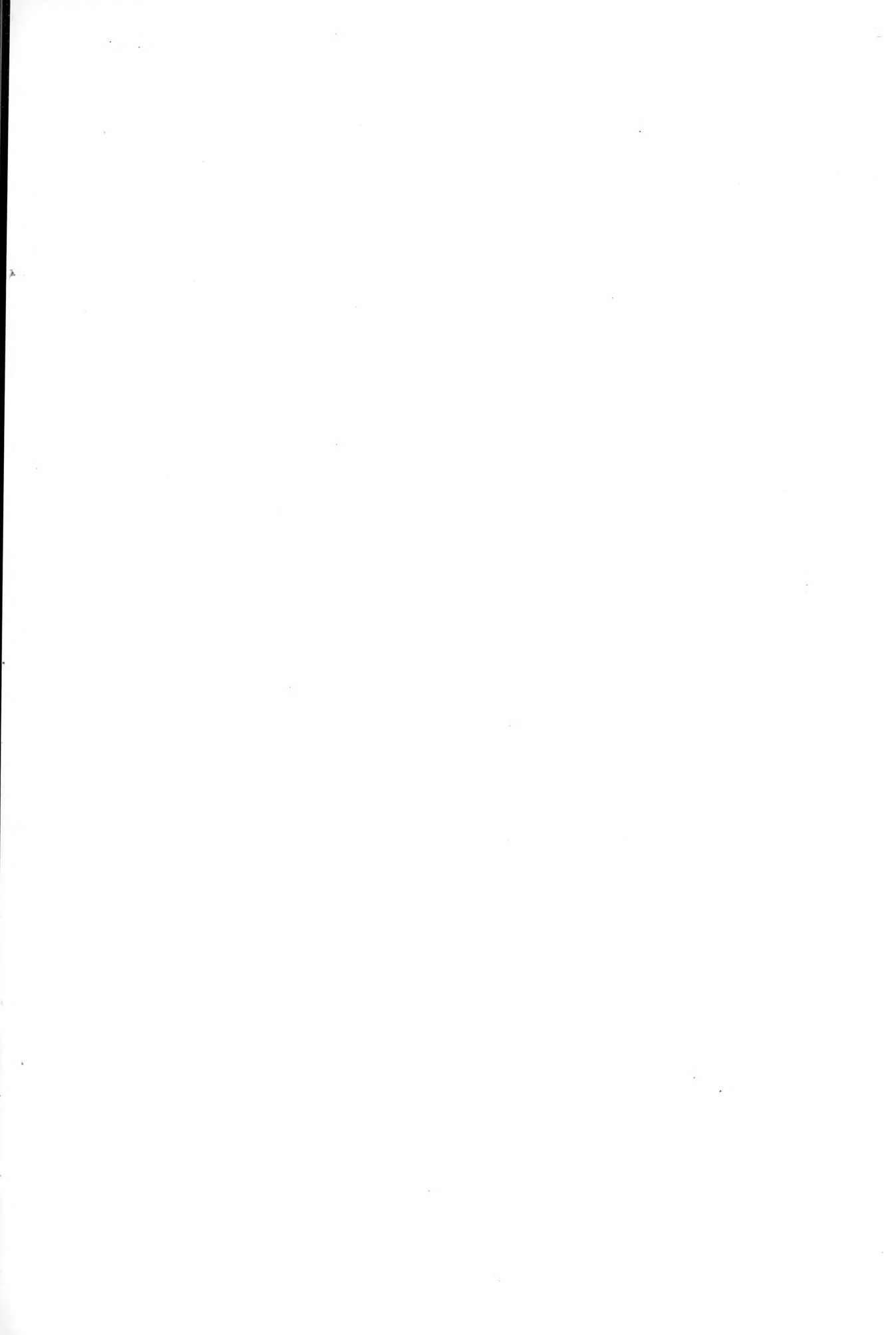
APPLICATION FILED MAY 12, 1904.

2 SHEETS—SHEET 1.



Witnesses:
Ed. S. Taylor,
John Enders.

Inventor:
Eugene M. Robinson,
 By *Dwight B. Cheever*
Att'y.



E. M. ROBINSON.
PHONOGRAPH.

APPLICATION FILED MAY 12, 1904.

2 SHEETS—SHEET 2.

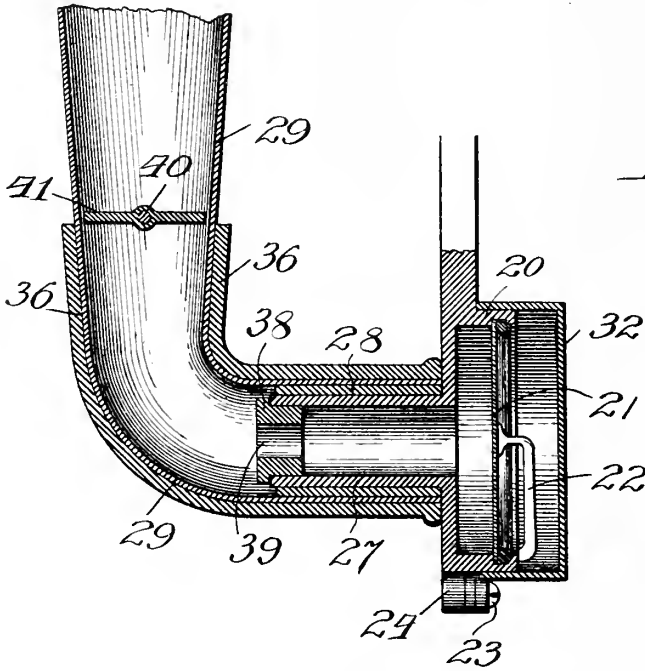


Fig. 5.

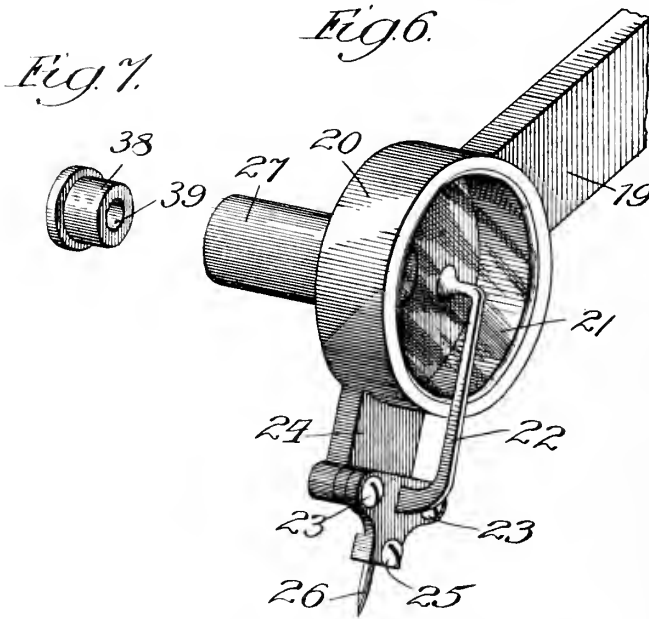
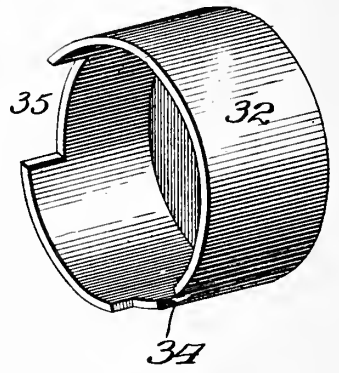


Fig. 6.

Fig. 7.

Fig. 8.



Witnesses:
Edw. C. Gaylord
John Enders

Inventor:
Eugene M. Robinson
 By *Dwight Blochever*
Attorney

UNITED STATES PATENT OFFICE.

EUGENE M. ROBINSON, OF CHICAGO, ILLINOIS.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 778,271, dated December 27, 1904.

Application filed May 12, 1904. Serial No. 207,713.

To all whom it may concern:

Be it known that I, EUGENE M. ROBINSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Phonographs, of which the following is a specification in its best form now known to me, reference being had to the accompanying drawings, in which similar numerals indicate the same parts throughout the several views.

My invention relates to phonographs; and the object of my invention is to so improve a reproducing-phonograph, particularly one designed for rendering music, that it can be satisfactorily used in a small room.

While a commercial phonograph-reproducer may be operated upon the sound-reproducing cylinder or disk record to produce music or spoken words of low volume of sound, it has been frequently demonstrated that such a device does not properly improve and round out the reproduced sound, and it is therefore substantially universally the practice to supply such instruments with a horn. Such a horn is in practice applied to one side of the reproducer, and the vibrations from that side only of the reproducer are collected in the horn. When a phonograph equipped with such a horn is used in a small room without there being any obstructions whatever in the horn, the tone of the instrument is much too loud for the air-space in the room. Where such instruments have been used in private houses, it has frequently been found necessary in order to have satisfactory results to place the instrument in one room and the audience in another at some distance; but this has the disadvantage of compelling the operator of the instrument to remain away from his friends and also to endure the discomfort of the loud sound of the instrument. As an alternative for this method of getting satisfactory results it has been attempted to muffle the phonograph sounds by stuffing some sort of an obstruction, usually a cloth wadding, in the bell of the horn; but I have found this method very unsatisfactory, for the reason that it destroys in a large measure the quality of the tone coming from

the horn. Furthermore, I have found that at all times the sound-waves from the side of the producer on which the horn is not attached can be heard by noticing them, but that when the horn itself is muffled, as just described, these sound-waves from the uninclosed side of the reproducer become very noticeable and unpleasant, because they are not properly taken care of and rounded out as they would be if a horn were also placed upon that side of the reproducer. It is also a fact that when a thin metallic horn, such as is commonly used, is muffled in some such manner as just described the sound-waves within the horn between the reproducer and the muffler are transmitted to the open air by the metallic body of the horn. Another disadvantage with many phonographs is that the reproducing-needle bears too heavily upon the record, thereby tending to unduly wear the record and destroy both its accuracy and its life and to cause an unpleasant and scratching sound.

The object of my invention is to provide means by which the horn of the phonograph may be muffled without injuring the quality of the tone coming from it, to provide means whereby the horn itself will not transmit through its walls any material volume of sound, to provide means by which the heretofore open side of the reproducer will be closed and substantially all sounds produced by it be retained within the instrument, and to provide means for adjusting the pressure of the needle-point upon the record to reduce the scratch.

My invention also consists in many details of construction, which will be hereinafter more fully described and claimed as the specification proceeds.

In the drawings, Figure 1 is a side elevation of one of the commercial forms of phonographs having my invention applied thereto. Fig. 2 is a side elevation of the details of mechanism for varying the weight or pressure of the needle upon the record-plate. Fig. 3 is a plan view of this mechanism, taken on line 3 of Fig. 2. Fig. 4 is a sectional end elevation taken on line 4 of Fig. 2. Fig. 5 is a center sectional detail view taken vertically through the horn and reproducer, showing my

invention applied thereto. Fig. 6 is a perspective view of an ordinary reproducer. Fig. 7 is a detail view of a plug to be inserted in the reproducer tube or horn to reduce the volume of vibrating air passing through it. Fig. 8 is a detail perspective view of a cap to be applied to the reproducer.

As heretofore described, my invention consists in improvements in phonographs of commercial use, and except as hereinafter pointed out the parts named, shown, and described are to be understood as merely representing for illustration one of the several commercial forms of devices to which my invention may be applied.

In the drawings, numeral 10 indicates the box or case of such a commercial instrument having within it a motor or engine adapted to be wound up by the operation of a crank 11, having on its end a handle 12. Attached to this motor 11 is a vertical rotatable shaft 13, having on its upper end a permanent disk 14. On this rotatable disk 14 are placed in succession different detachable record-plates or "records" 15, having impressed upon their surfaces the sound-record either of words or music or of other sounds which are to be reproduced by the instrument. Extending from the box 10 is a stationary support 17, having in its end 58 a pivoted post 57, bearing at its upper end a block or casting 48. Pivoted to this casting 48 at 18 is another arm, 19. Either integral with or rigidly secured to the end of this arm 19 is a usually cylindrical case 20, wholly open on one face, as shown, and opened into the restricted passage-way 27 on the opposite side, as shown, having within it at approximately its center a vibrating diaphragm 21, usually of mica. Rigidly secured to this mica disk 21, which will be hereinafter referred to as the "reproducer-disk," is a depending arm 22, adapted to vibrate, having its lower end supported, while allowing free vibration, by the screws 23, which enter the depending rigid support 24, secured to the bottom of the cylinder 20. Detachably secured to the lower end of this depending vibratory arm 22 by a screw 25 is a detachable needle 26, adapted to bear in a spiral groove in the surface of the record-plate 15. Inclosing the tube 27, heretofore referred to, is a rubber bushing 28, on which fits the horn 29. This bushing 28 may be secured either to the tube 27 or to the inside of the horn 29 and slip along the other of said members. The function of this bushing 28 is to make an air-tight joint between the horn and the tube.

In the operation of this commercial phonograph just described the propelling-motor rotates shaft 13 and the disk 14, with the record 15 upon it, under the needle 26. The needle 26 is thus given by the irregularities of the path of the record made therein at the time the record itself is made a sidewise vibratory motion, and this motion is communi-

cated, through the vibratory arm 22, heretofore described, to the reproducer-diaphragm 21, which diaphragm vibrates and gives the sounds which were impressed upon the record when it was made. The vibrations of the front of this diaphragm are open, as shown in the front of Fig. 6, and the vibrations of the other side of the diaphragm travel through the tube 27 and out through the horn 29 into the air, this horn being used to collect and amplify the sound tones. When only the parts described are used, the sound thus amplified by the horn is so great that except by placing one's ear near the reproducer-disk 21 the sounds coming from the reproducer shown in the front, as in Fig. 6, are not particularly noticed. The volume of sound, however, coming from the horn of the phonograph of ordinary size is, as heretofore described, altogether too great for use in an ordinary room, and it has heretofore been the practice to stuff a muffler, consisting usually of a wad of something, in the bell of the horn. As soon as this is done the volume of sound passing through the horn is reduced and rendered unsatisfactory, and at the same time the sound-waves which escape from the front of the reproducer-disk are greatly accentuated. Under these conditions I also find that even the neck of the horn adjacent to the tube 27 vibrates and sends out sound-waves into the room. All of these conditions render the use of the instrument almost as unsatisfactory in a room of ordinary size as when an unmuffled horn is used. In order to avoid these disadvantages, I provide the following mechanism: I first provide a cap 32, made (in the case of the instrument shown) cylindrical in form to fit over the flange 20, inclosing the reproducer-disk. If, however, the reproducer-disk is inclosed in a case of a different shape, this cap should be made to conform to that shape. I make this cap of some material which does not readily transmit vibratory sounds, and if a substance which does not transmit any such sounds can be obtained such substance should preferably be used. In practice I have found a cap made of heavy cardboard very satisfactory. This cap fits upon the face of the reproducer very closely, but has cut in its lower edge a notch 34, through which the depending vibratory arm 22 passes and in which it can freely vibrate. I also provide a notch 35 to engage the arm 19. This notch merely serves as a guide, so that the cap will always be in the same position, thereby insuring that the vibrating arm 22 shall be free to vibrate in notch 34 without any danger of coming in contact with the cap. I furthermore find it of great advantage to inclose the elbow of the horn in a non-sound-vibration-transmitting tube 36, preferably a thick piece of hose made of soft rubber. In practice I have found that such a piece of hose about an eighth of an inch thick stops

substantially all perceptible transmission of sound through this elbow of the horn. In order to dispense with the muffler-wad in the end of the horn, I provide a plurality of rubber plugs 38, each adapted to fit inside of the tube 27 and each having an orifice 39 of a different size in its center. By removing the horn 29 from the tube 27 and substituting a plug of different-sized openings 39 I am able to regulate the volume of sound-waves passing into the horn from the reproducer. In order to further regulate the volume of sound-waves passing through the horn, I pivot at 40 within the horn a damper 41, made like an ordinary stovepipe-damper, adapted to be opened and closed either by an extension of the rod 40 through the surface of the horn or by an instrument inserted in the bell of the horn, thereby in different positions of the damper 41 regulating the volume of sound-waves passing through the horn.

While I have used the rubber plug 38 with success, I recommend that when the devices are made in commerce that a damper like the one 40 be placed in the reproducer-tube 27 in place of the plug.

Another great difficulty in commercial practice lies in the fact that the needle 26 presses too hard upon the record, thereby wearing it out, and also, what is more important, accentuating in the sound produced any irregularities impressed upon the record. In order to do away with this difficulty, I attach to the arm 19, heretofore described, by clips 44 a horizontal member 45, and I also inclose the casting 48 with a supplemental member 46. To the member 48 I secure, by means of screws 47, another horizontal member 49. These parts become when attached practically a part of the casting 48. In the arm 49 is a hole 50, and in the arm 45 is a hole 51, and through these holes 50 and 51 I pass a bolt 52, having its head 53 bearing against the pivoted moving member 45 and having on its shank a spring 55, bearing against a detachable thumb-screw 56. By turning this thumb-screw 56 up and down on screw 52 against the action of spring 55 I am able to move the movable arm 45 to and from the arm 49, thereby adjusting the weight of the horn and the reproducer upon the needle 26, and therefore regulating the pressure of the needle upon the record. In other words, the action of this device is just the same as though I hung a variable counter-weight on the arm 45.

When any of the commercial types of phonographs are equipped with these attachments just described, I find that I can, first, by regulating the thumb-screw 56 vary the pressure of the needle 26 upon the record, thereby decreasing the "scratch" of the needle upon the record. I also find that by using the cap 32 the sound-waves transmitted from the open side of the reproducer are almost entirely eliminated, thereby rendering the instrument

much more useful in an ordinary room irrespective of whether or not the other features of the device were used. By using either or both of the adjustable devices 38 and 41 I am able to reduce the volume of sound passing through the horn without injuring the quality, and I therefore improve the instrument. The use of the covering 36 over the elbow of the horn does away with the transmission of sounds through the elbow of the horn and renders it still more effective for use in an ordinary room.

By the use of the above devices here shown I can readily convert a large phonograph suitable only for concert purposes so that it can be satisfactorily used in ordinary rooms without its being distasteful to the audience in the same room.

I do not wish to be limited as to the form of phonograph to which my invention shall be applied. All of these features are by mere slight changes in form as readily adaptable for a phonograph of the cylindrical type as one of the disk type, as here shown, without departing from my invention.

I do not wish to be limited to the exact details of construction, which may be varied within reasonable limits without departing from the principles of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a phonograph the combination of a record, a standard, an arm pivoted to said standard carrying a reproducer bearing on said record, a supplemental arm secured to said standard, a supplemental arm secured to said main arm, and means engaging both of said supplemental arms adapted to vary the angle of the arm to the standard, whereby the pressure of the reproducer on the record is varied.

2. As an article of manufacture for use in a phonograph a removable cap made of substantially imperforate substantially non-sound-transmitting material, adapted to slidably fit over and cover one side of the reproducer of the phonograph.

3. As an article of manufacture for use in a phonograph a removable cap made of substantially imperforate substantially non-sound-transmitting material, adapted to slidably fit over and cover one side of the reproducer of the phonograph, there being a notch or notches cut in the sides of said cap adapted to fit over fixed points on a reproducer whereby said cap can only be inserted upon the reproducer in a predetermined proper position.

4. In a phonograph, in combination with a record, a reproducer in operative connection therewith and a horn attached to said reproducer, adjustable means within the horn for restricting the opening within the horn for the passage of sound.

5. In a phonograph in combination with a

record, a reproducer in operative connection therewith and a horn attached to said reproducer; adjustable means within the horn near the reproducer adapted to restrict the opening within the horn for the passage of sound and other adjustable means between said first adjustable means and the end of the horn adapted to restrict the volume of sound passing through the horn.

10 6. In a phonograph the combination of a record, a reproducer in operative connection therewith and a horn attached to said reproducer; a damper mounted in the path of sound-waves passing from the reproducer through

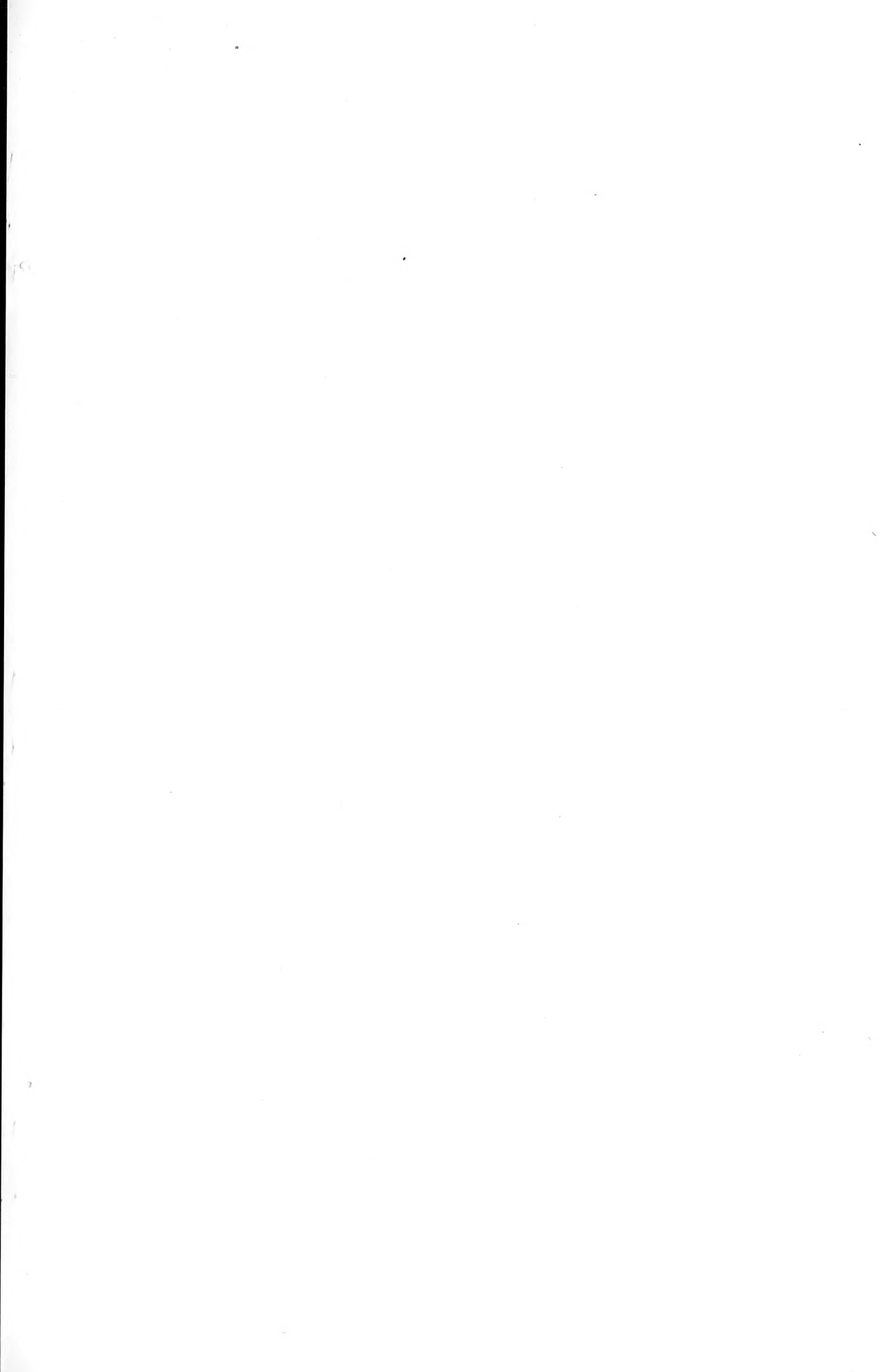
the horn adapted to be turned upon its axis 15 to different positions to restrict the volume of sound-waves passing through the horn.

7. In a phonograph, the combination of a reproducer, a horn attached thereto, a damper or sound-restricting device within the horn 20 and a substantially non-sound-transmitting covering inclosing the portion of the horn between the reproducer and said damper.

EUGENE M. ROBINSON.

Witnesses:

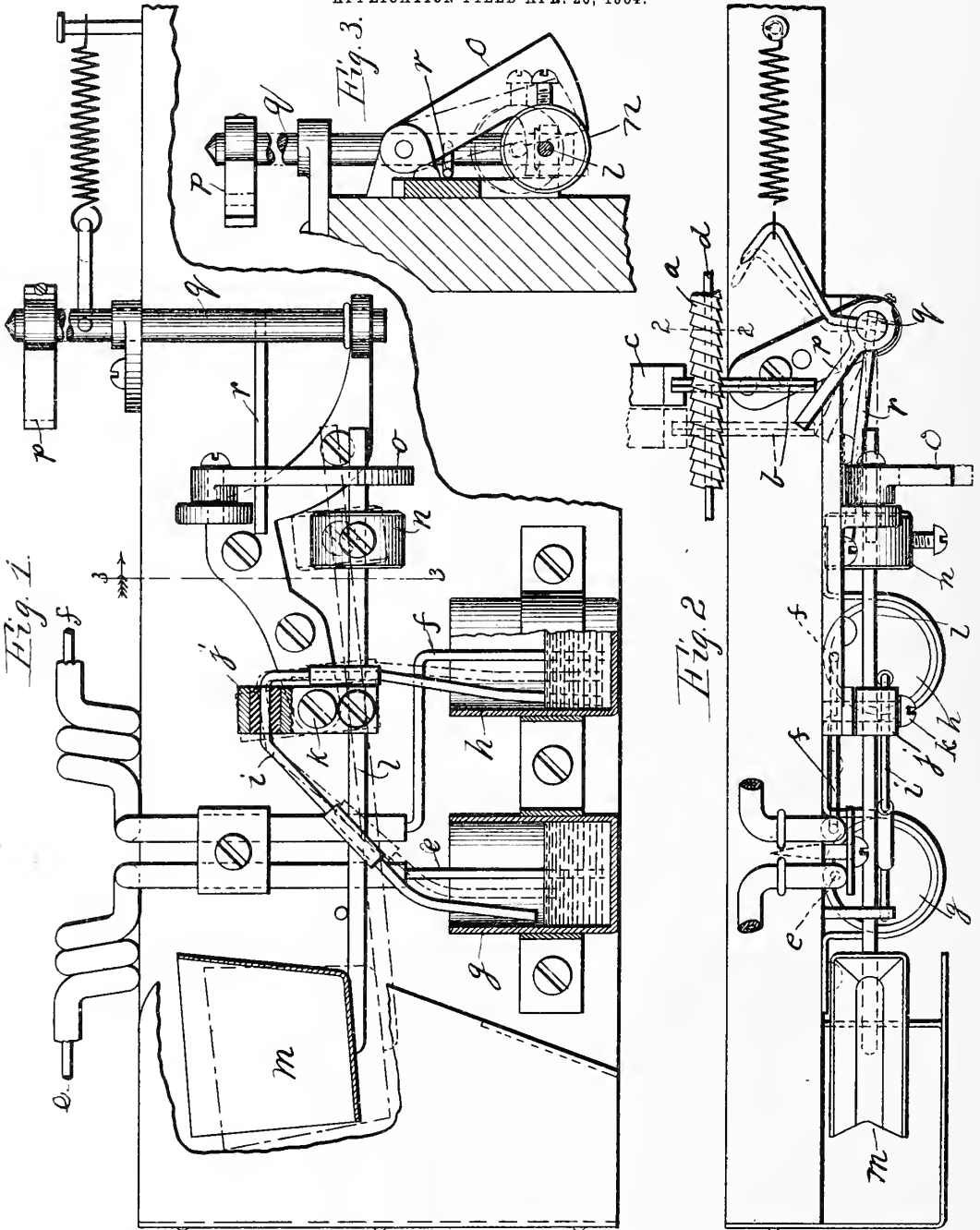
DWIGHT B. CHEEVER,
CHAS. E. GAYLORD.



A. W. COLE.

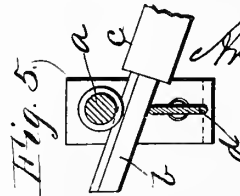
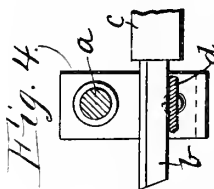
COIN CONTROLLED CIRCUIT MAKING AND BREAKING APPARATUS FOR PHONOGRAPHS.

APPLICATION FILED APR. 26, 1904.



WITNESSES:

L. Almquist
b. Bedqvist



INVENTOR

Arthur W. Cole

BY

A. O. Hayden

ATTORNEY

UNITED STATES PATENT OFFICE.

ARTHUR W. COLE, OF WEST HOBOKEN, NEW JERSEY.

COIN-CONTROLLED CIRCUIT MAKING AND BREAKING APPARATUS FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 778,305, dated December 27, 1904.

Application filed April 26, 1904. Serial No. 204,935.

To all whom it may concern:

Be it known that I, ARTHUR W. COLE, a subject of the King of Great Britain, and a resident of West Hoboken, county of Hudson, and State of New Jersey, have invented certain new and useful Improvements in Coin-Controlled Circuit Making and Breaking Apparatus for Phonographs, of which the following is a specification.

The invention consists of novel means of closing the phonograph - operating circuit when the coin is dropped in the slot, maintaining the closure, and breaking it automatically when cessation of the operation of the machine is due, as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is partly an elevation and partly a vertical section of the apparatus of my invention. Fig. 2 is a plan view. Fig. 3 is a detail in vertical section on the line 3 3 of Fig. 1 as seen looking in the direction of the arrow. Figs. 4 and 5 are details in section on line 2 2, Fig. 2, showing some of the parts attached to the phonograph for breaking the circuit when on the return of the diaphragm-carriage to the starting-point.

The apparatus herein shown is mainly the automatic circuit-closing devices for closing the circuit and setting the phonograph in motion by the effect of a coin dropped into the coin-receptacle. It is therefore unnecessary to show the phonograph any further than the reversing-screw of the diaphragm-carriage and the attachment falling into gear with said screw when the diaphragm-carriage is released from the feed-screw for reversing the carriage.

The diaphragm-carriage-reversing screw is represented at *a*, Figs. 2, 4, and 5. *b* represents a knife-shaped blade carried by a staff *c*, attached to the diaphragm-carriage, which by the turning of a flat blade *d* at the proper time is thrust up into engagement with screw *a* for reversely shifting the diaphragm-car-

riage, the normal positions of said blades *b* and *d* being shown in Fig. 4, in which the screw has no effect on blade *b*. The means for so turning blade *d* is well known in connection with phonographs and need not be shown or described.

The respective wires *e* *f* of the circuit have their terminals immersed in mercury-cups *g* *h*, respectively.

A yoke-shaped circuit closing and breaking wire *i* is carried on a rocking support *j*, pivoted at *k*, with its terminals in such relation to the mercury-cups that in one of the positions of the rocking block (the same that is shown in the drawings) one terminal will lack connection with the mercury and the circuit will be broken; but in the reverse position of said block both terminals will connect with the mercury-cups and the circuit will be closed.

The rocking block is also attached to the staff *l*, that carries at one end the coin-receptacle *m*, and is poised by a weight *n* near the other end, so that when no coin is in the receptacle *m* it will shift upward; but the coin dropped in will overbalance the said receptacle and elevate the other end of the staff *l*, at the same time escaping from the receptacle *m*.

A gravitating-hook *o* swings under the end of the staff that is thus elevated and holds it up, and while so held up maintains the circuit connection the requisite predetermined time.

When the knife *b*, engaged with the reversing-screw *a*, nearly reaches the end of its reverse movement, the end of said knife collides with an arm *p* on a vertical rock-shaft *q*, carrying a tripping-arm *r*, which bears against the gravitating hook *o* and trips it out of engagement with staff *l*, which falls to a level position ready for reception of another coin for another operation.

What I claim as my invention is—

The combination with the phonograph reversing-screw and its coacting blade, of the mercury-cups containing circuit-terminals re-

spectively, the rocking yoke-circuit making
and breaking wire also having its terminals
in said cups respectively, and mounted on the
staff of the rocking coin-receptacle, said re-
5 ceptacle carried on said staff, gravitating
hook for controlling the coin-receptacle, rock-
shaft, lateral arm thereon coacting with the
reversing-screw-controlling blade, and the

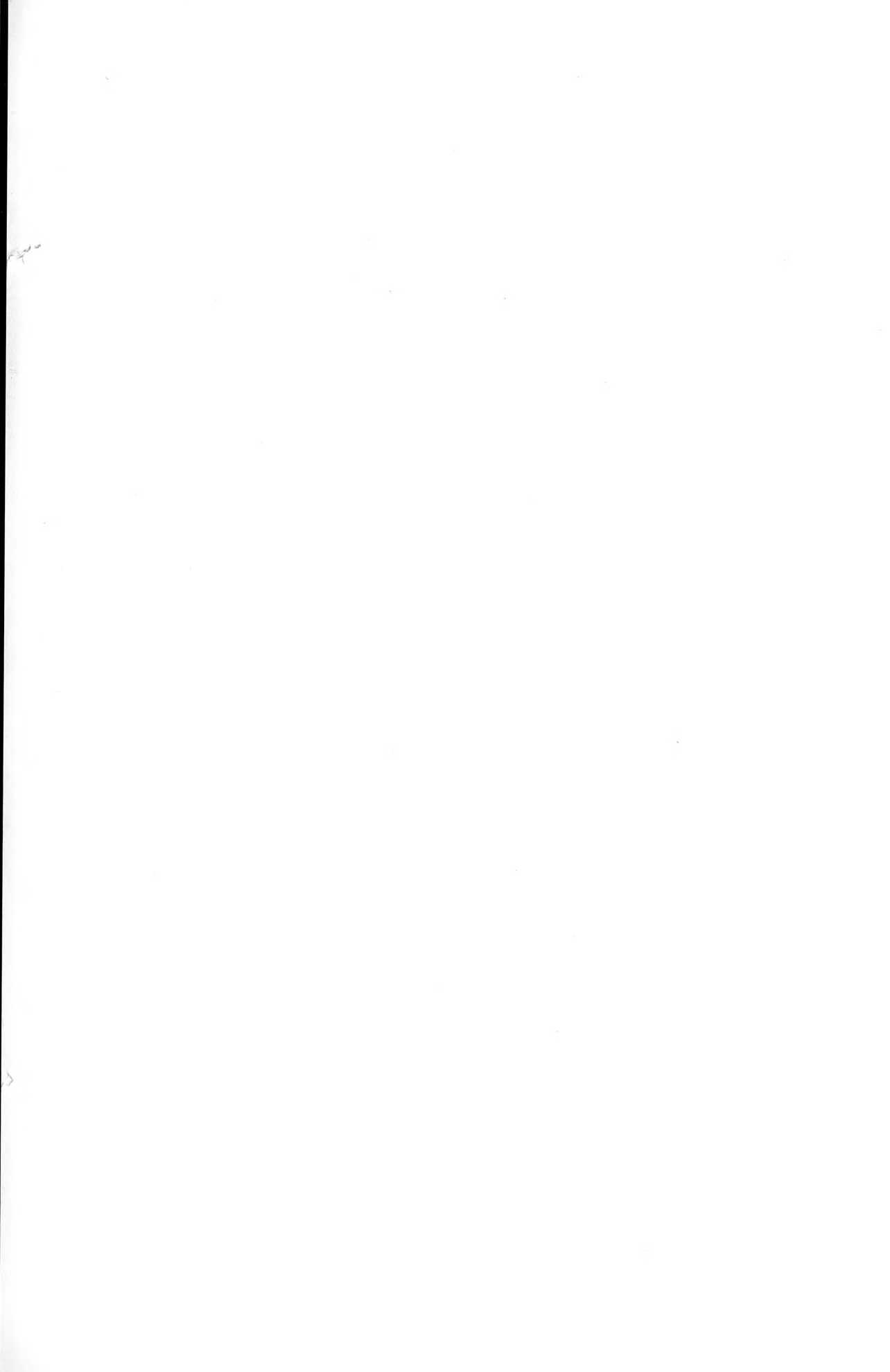
tripping-arm on said rock-shaft controlling
the gravitating hook. 10

Signed at New York this 22d day of April,
1904.

ARTHUR W. COLE.

Witnesses:

C. SEDGWICK,
J. M. HOWARD.

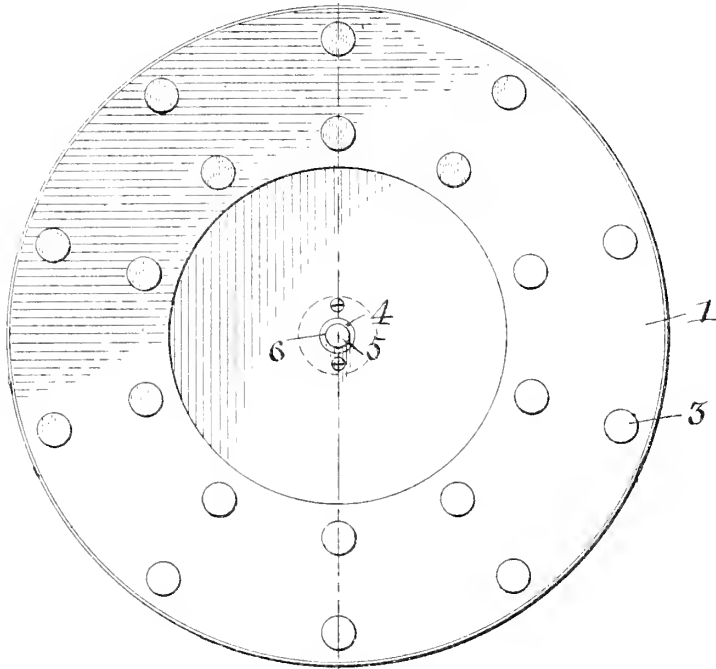


No. 778,492.

PATENTED DEC. 27, 1904.

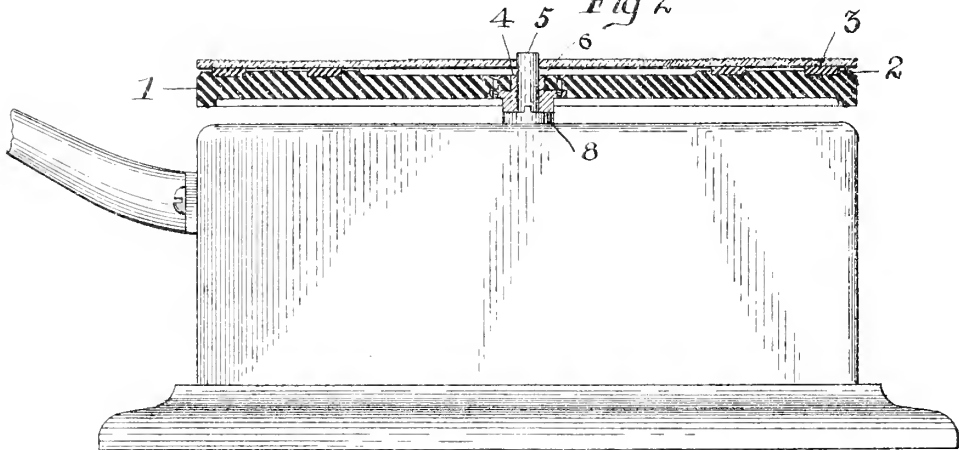
E. R. JOHNSON.
TURN TABLE FOR TALKING MACHINES.
APPLICATION FILED MAR. 14, 1902.

2 | Fig 1.



2

Fig 2



WITNESSES:

Edu. W. Vaill Jr

Chas. Bennett

INVENTOR:

Eldridge R. Johnson
By James Lewis,
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

TURN-TABLE FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 778,492, dated December 27, 1904.

Application filed March 14, 1902. Serial No. 98,157.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, residing at Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Turn-Tables for Talking-Machines, of which the following is a full and complete disclosure.

In general my invention consists in providing a turn-table which will have the record carried thereby held without the aid of screws, clamps, or other fastening means; and it also consists in providing a table of such a construction that its efficiency is increased, with its weight and cost of manufacture decreased.

For a full and detailed description of my invention reference may be had to the following specification and to the accompanying drawings, in which—

Figure 1 is a plan view of the turn-table; and Fig. 2 is a sectional view of the same, taken on the line 2 2 of Fig. 1, but also showing the motor-casing in elevation.

In the figures, 1 indicates the turn-table. In this instance the turn-table is made of some suitable light but durable material, such as hard rubber, duranoid, celluloid, &c.

2 indicates recesses in the table, which recesses carry small pieces or pads 3 of soft rubber or other similar material. These pads are cemented or otherwise retained in said recesses in any suitable manner. A suitable number of these pads or friction-disks are arranged upon the surface of the turn-table to give the required frictional hold upon the record-disk and at the same time support the disk at the requisite number of points.

A suitable metallic bushing 4 is fastened in an opening 6 in the turn-table at its center and is retained in position by any well-known means, here shown as a flange and screws. This bushing is adapted to fit over the central stud 5 of the driving-spindle 8, which is adapted to be rotated by a motor energized by electricity, springs, or by hand, as choice determines.

It will be apparent that it is only necessary

to place the record upon the turn-table with the stud 5 passing through the central opening in the same in order that the record may be in position to reproduce the sound-waves. The peculiar friction resulting from the small disks not only positively carries the record with the table, but also allows the former to yield slightly. This form of table also has the advantage over the usual plain pad of felt, rubber, or other frictional material in that no air is confined between the surface of the table and record to reduce the frictional hold between the same.

Minor changes in detail may be made by one skilled in the art without affecting the spirit of my invention, and I do not wish to be limited to the exact form and arrangement of parts as herein set forth; but

What I claim, and desire to protect by Letters Patent, is—

1. A turn-table for talking-machines, comprising a rotatable disk, of light non-metallic material having a plurality of series of recesses at intervals in its upper surface, flat pads of soft rubber secured in said recesses, to project from said surface, substantially as described.

2. A turn-table for talking-machines comprising a rotatable disk of duranoid, having a plurality of series of recesses at intervals in its upper surface, small disks of soft rubber secured in said recesses, to project from said surface, substantially as described.

3. In combination, a turn-table for talking-machines comprising a rotatable disk having a plurality of series of recesses at intervals in its upper surface, small disks of soft rubber secured in said recesses, to project from said surface, and a sound record-disk carried by said table, substantially as described.

In witness whereof I have hereunto set my hand this 10th day of March, A. D. 1902.

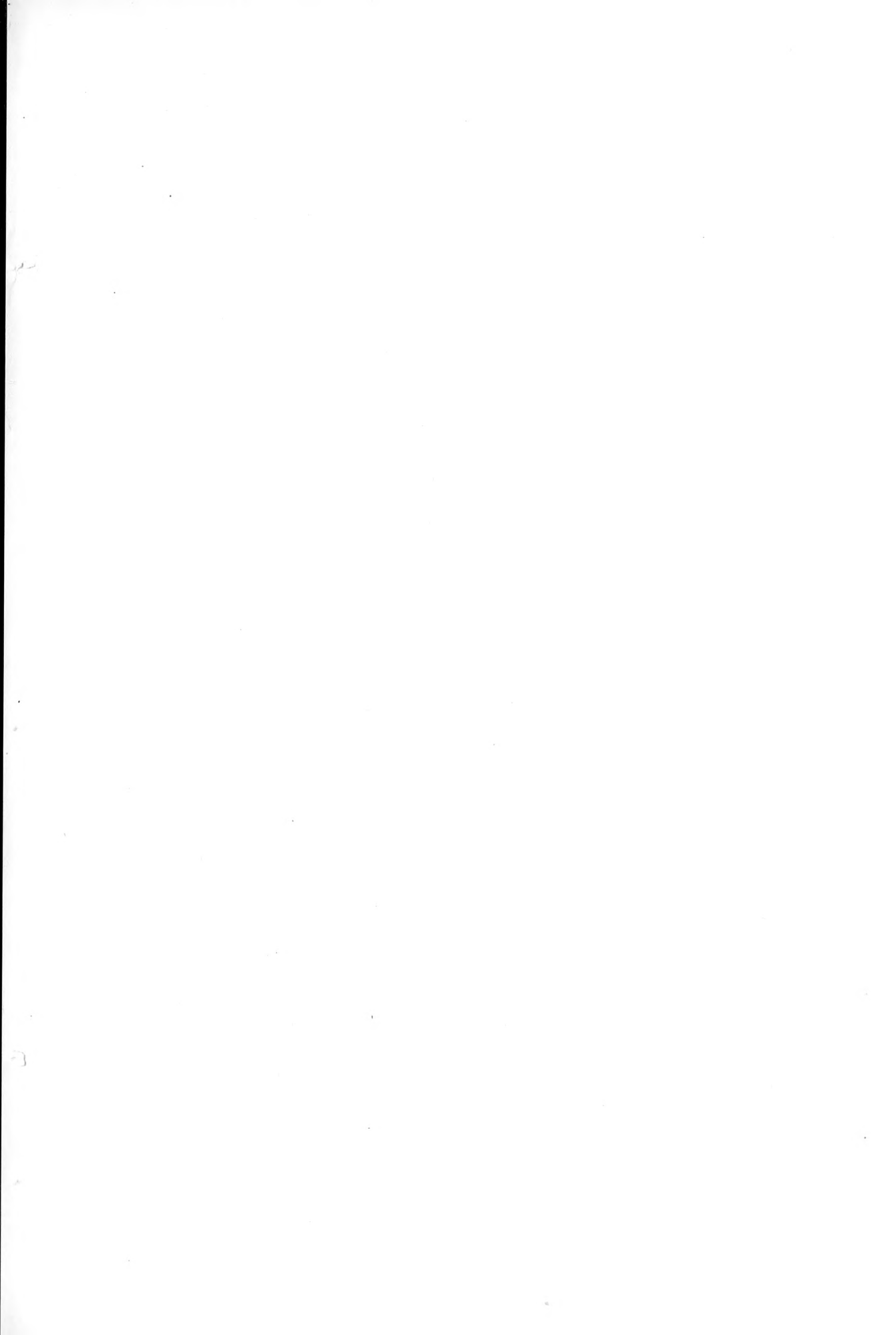
ELDRIDGE R. JOHNSON.

Witnesses:

S. V. COXETER,

J. K. MUNNERLYN.





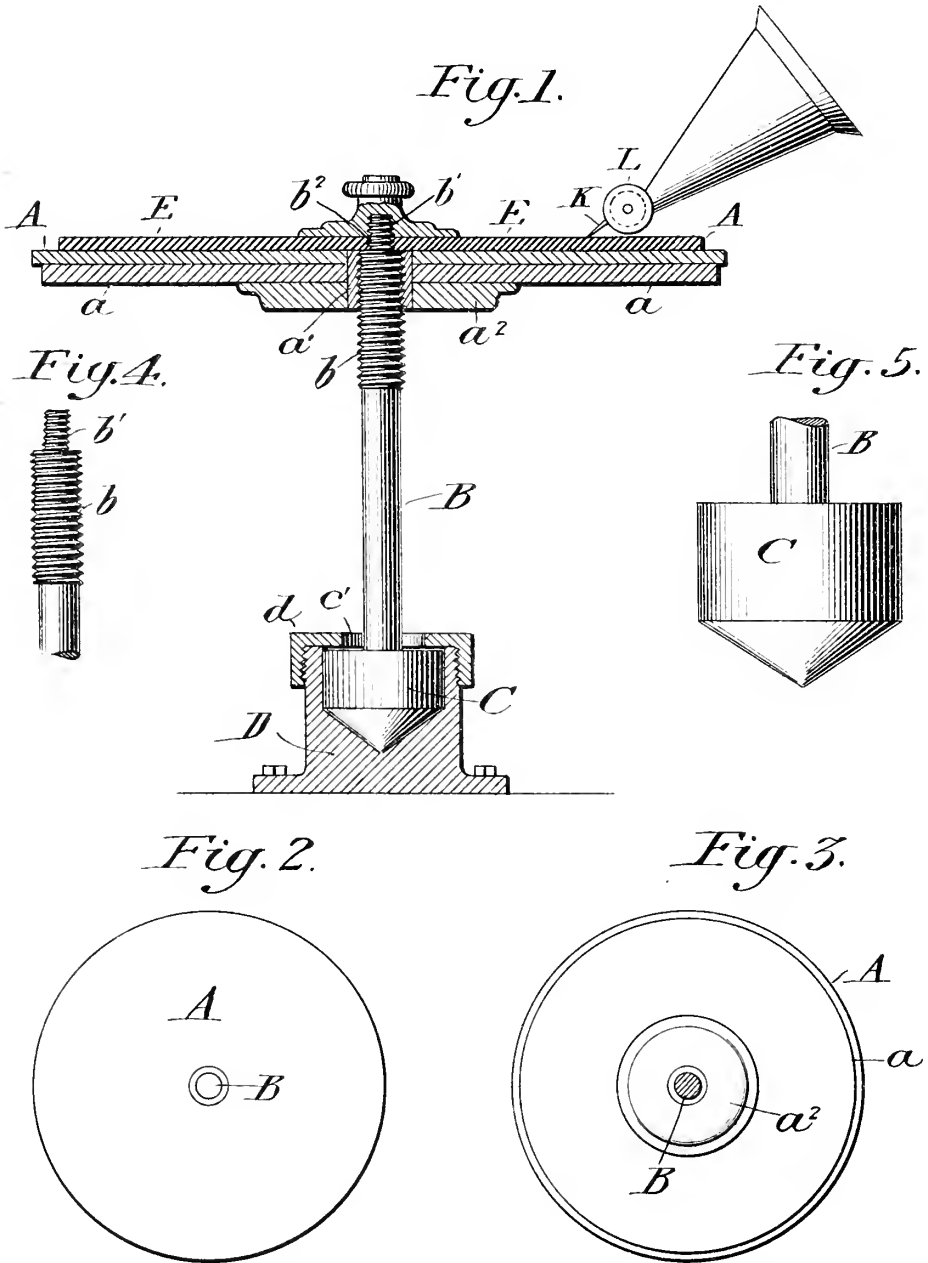
No. 778,543.

PATENTED DEC. 27, 1904.

J. LE MON & F. C. VON HEYDEBRAND UND DER LASA.

DISK TALKING MACHINE.

APPLICATION FILED AUG. 15, 1902.



Witnesses:
Charles J. Hamburg
Gustav Oberlander

Inventors
James Le Mon
Ferdinand Christoph von Heydebrand
und der Lasa

UNITED STATES PATENT OFFICE.

JAMES LE MON AND FERDINAND-CHRISTOPH VON HEYDEBRAND UND
DER LASA, OF NEW YORK, N. Y.

DISK TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 778,543, dated December 27, 1904.

Application filed August 15, 1902. Serial No. 119,774.

To all whom it may concern:

Be it known that we, JAMES LE MON and FERDINAND-CHRISTOPH VON HEYDEBRAND UND DER LASA, citizens of the United States, and residents of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Disk Talking-Machines, of which the following is a specification.

This invention relates to what are known as "talking-machines" of the "disk" variety, such as the gramophone, xonophone, Columbia, Victor, &c.

The object of this invention is to render said machines capable of reproducing the sounds, both vocal and instrumental, recorded on the disks or records with complete fidelity, accuracy, volume, and expression.

The requisite uniformly-level rotation of the record is obtained by assuring the perpendicularity of the main carrying-plate spindle and so boxing it in at its base as to prevent any tendency to lift while rotating and giving the carrying-plate an increased gravity to annul its centrifugal tendency to undulate at the periphery and by properly supporting the said heavy carrying-plate rigidly upon its driving-spindle. The increased gravity of the carrying-plate is obtained by the addition to the present plate of a disk, plate, segment, ring or rings of (preferably) non-resonant material or metal, preferably lead, attached to or cast with or upon said carrying-plate, or said plate may be made of an integral lead casting or sheet centrally bushed with a threaded bushing through which the spindle passes and is screwed in.

When our invention is adapted to old machines with the usual carrying-plate, the additional weight may be in a form of a disk or disks, ring or rings, plate or plates, segment or segments, so attached to either (preferably the "lower") face of the present carrying-plate as to cause a proper distribution of balance in same, or peripheral rings or segments may be cast onto or attached to the said carrying-plate. As regards the material used to increase the gravity of the carrying-plate we prefer to use lead on account of its great

weight per area and its lack of resilience which prevents any vibration which may arise from the use of resonant metal for this purpose. The gravity of the carrying-plate may be increased up to any practical degree according to the size of the instrument for the desired result. Any tendency which the main spindle which drives the rotating carrying-plate may have to lift while rotating is prevented by placing an overhang cover on the step-box in which the spindle-pivot revolves, the overhang in the step-box cover forming contact with a shoulder made on the pivot to prevent its leaving the box or rising beyond the lower face of the overhang cover. This arrangement in combination with the greatly-increased gravity of the carrying-plate prevents all ill effects from radial centrifugal action or undulatory motion of the carrying-plate and the record fastened thereon.

In the accompanying drawings, wherein our invention is shown as applied to the carrying-plate of a disk talking-machine as at present constructed by the addition of weight thereto and also to a new machine wherein the carrying-plate is made originally or cast of sufficient weight, similar parts are always denoted by similar letters.

Figure 1 is a vertical section of the parts of the instrument showing our invention; Fig. 2, a top plan of carrying-plate and spindle; Fig. 3, a bottom part of carrying-plate and boss; Fig. 4, a vertical section of upper end of spindle; Fig. 5, a vertical section of lower end of spindle.

A indicates the carrying-plate for the disk-record. Said carrying-plate is made heavier by the addition thereto of a disk or disks, plate or plates, ring or rings, segment or segments, block or blocks *a* of a preferably non-resonant metal—lead, for instance—and is fitted with an internally-threaded passage, bushing, or socket *a'* for the passage and attachment of spindle B. The plate A has cast onto or affixed to it on its under side a balancing internally-threaded boss *a''* to insure level rotation on spindle B, said boss forming a vertical extension of plate A.

B indicates the driving-spindle for carrying-

plate A, which spindle has thereon a main screw-thread *b*, running from the level of the upper face of the carrying-plate down to and below the under side of said carrying-plate and its threaded boss or extension and also a smaller threaded top portion of less diameter, *b'*, for the internally-threaded knob or clamp plate *b''*, which secures the record to the face of the carrying-plate A, and said spindle B has at its lower extremity a pivot C, upon which it rotates.

C indicates the pivoted lower end of driving-spindle B. This pivot is formed of greater diameter than the rest of the spindle above it, so as to form a shoulder *c'* to prevent its lifting in the step-box D, and it finishes at the extreme lower end in cone form turned true to fit and work in its step-box D.

D indicates the step-box for pivot of spindle B, having thereon an overhang removable cover *d*, screwed to its upper end, to overhang the shoulder *c'* on the pivot C, and thus prevent it from rising in its step while revolving.

E indicates the disk-record, containing the groove or music-track for the reception and guidance of stylus K, actuated by sound-box L.

Having thus described our invention and the method of carrying same into effect, we claim as follows:

1. In a disk talking-machine, a weighted-disk-record support, a vertical shaft upon which said support is mounted, a box-step for the lower end of said shaft, and a cap for said box-step engaging said shaft to prevent vertical movement of said shaft, as described.

2. In a disk talking-machine, a weighted-disk-record support, a shaft upon which the support is mounted, a supporting-disk beneath said weighted disk and adjustable upon said shaft and a clamping-cap to clamp against the weighted-disk support.

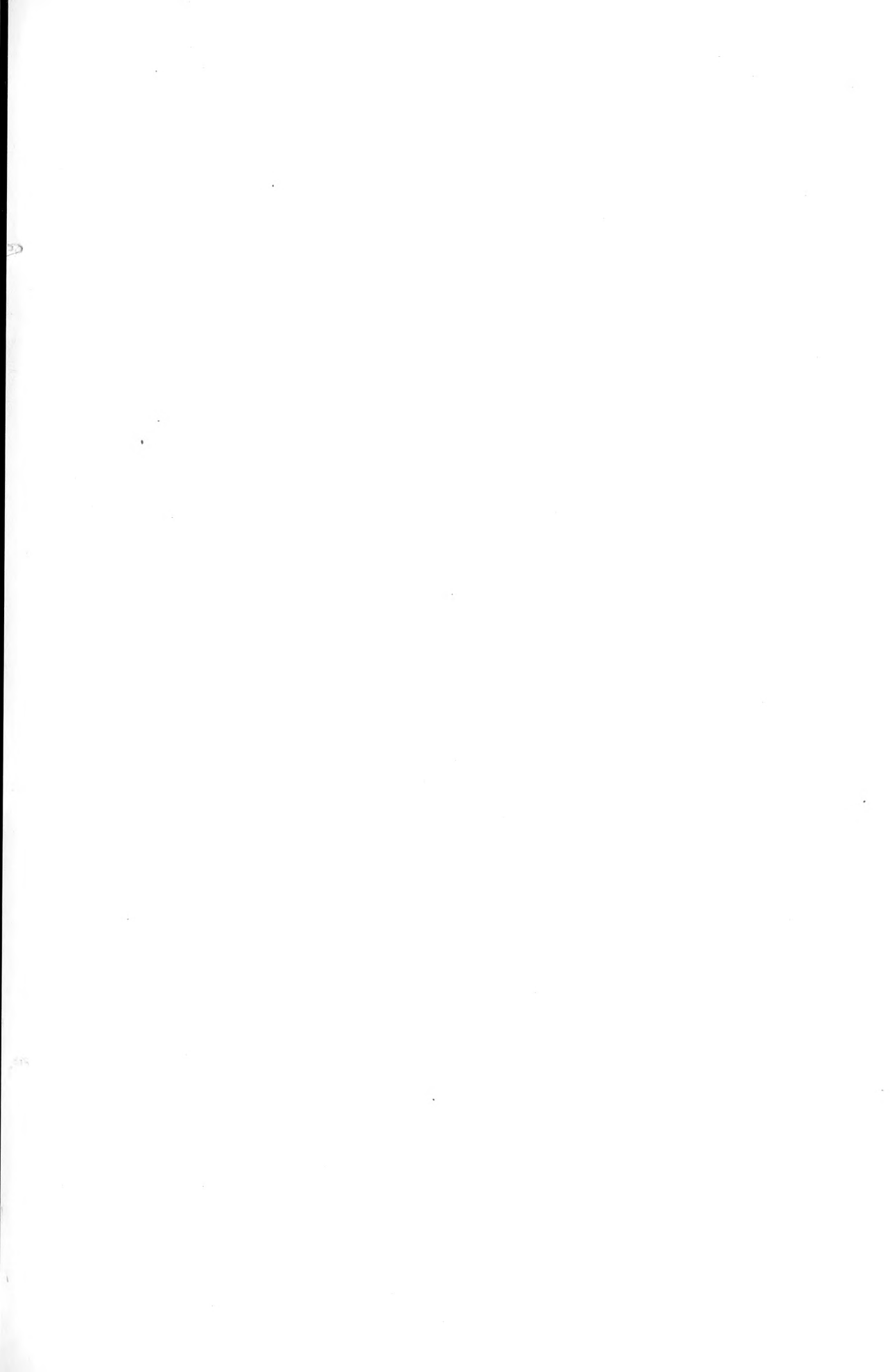
3. In a disk talking-machine a weighted-disk-record support, a vertical shaft upon which said support is mounted, the lower end of said shaft being fitted with a shoulder and turning in a box-step and a cap to prevent vertical movement of said shaft.

4. In a disk talking-machine, a weighted-disk-record support, a vertical shaft upon which said support is mounted, the lower end of said shaft being fitted with a larger cylindrical portion terminating in an inverted cone forming a shouldered pivot and turning in a box-step and a cap overhanging said shoulder and box-step to prevent vertical movement of said shaft, which said shaft is at its upper end properly threaded for securing thereon the weighted-disk support, and a supporting-disk beneath said weighted disk, and a clamping-cap above said weighted disk for clamping the music-record to the said weighted-disk-record support.

Signed at New York, in the county of New York and State of New York, this 14th day of August, A. D. 1902.

JAMES LE MON.
FERDINAND-CHRISTOPH VON
HEYDEBRAND UND DER LASA.

Witnesses:
A. J. DONAGHY,
CHAS. J. HAMBURG.



DEVICE FOR RELEASING REPRODUCERS FROM RECORDS OF TALKING MACHINES.

APPLICATION FILED APR. 27, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

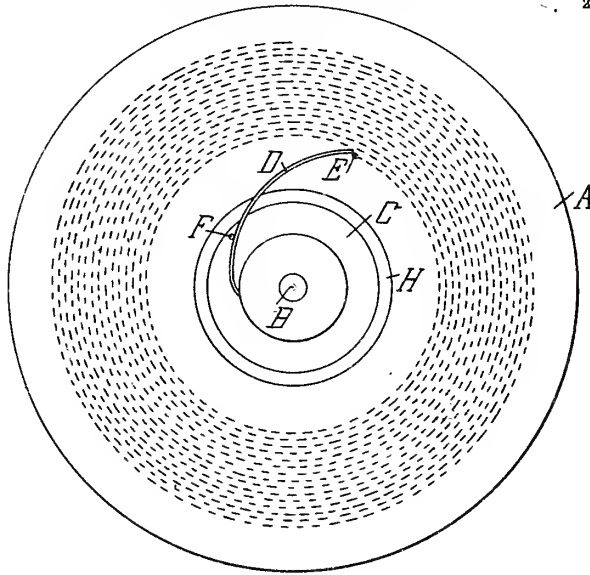


Fig. 2.

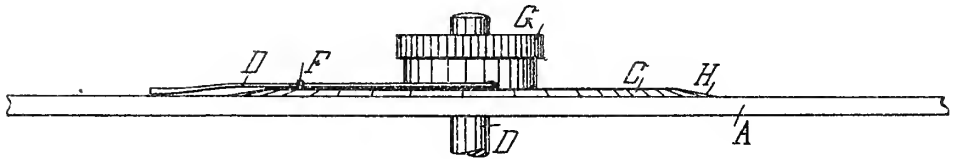
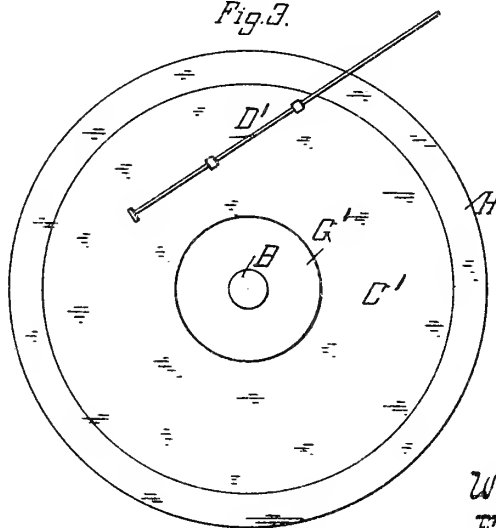
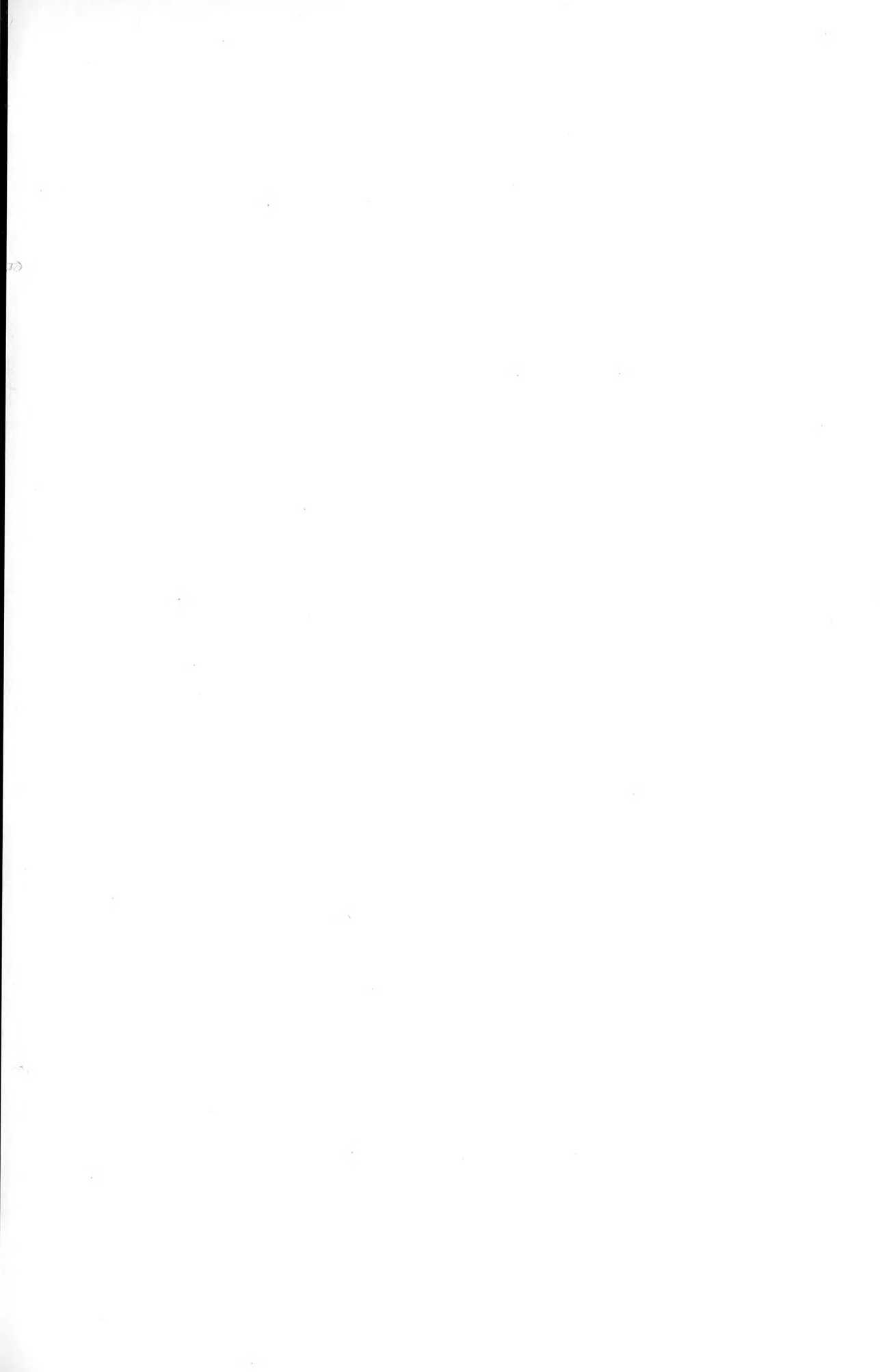


Fig. 3.



Witnesses
 William Miller
 George Kulsberg

Inventors
 William Lochmann
 Fritz Lochmann
 By W. C. Hauff
 Attorney



F. & W. LOCHMANN.
DEVICE FOR RELEASING REPRODUCERS FROM RECORDS OF TALKING
MACHINES.

APPLICATION FILED APR. 27, 1904.

2 SHEETS—SHEET 2.

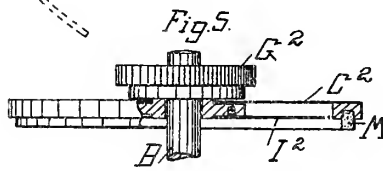
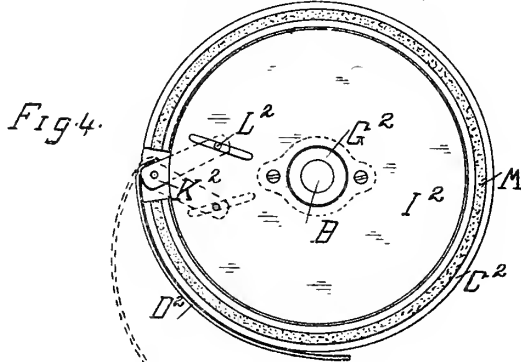
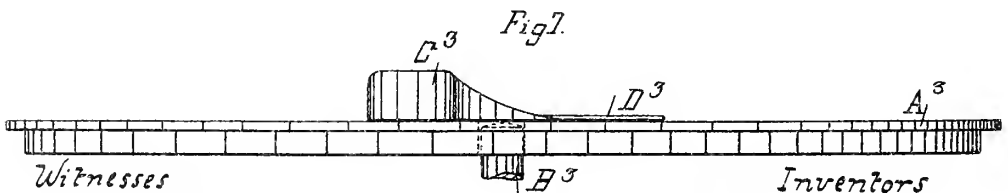
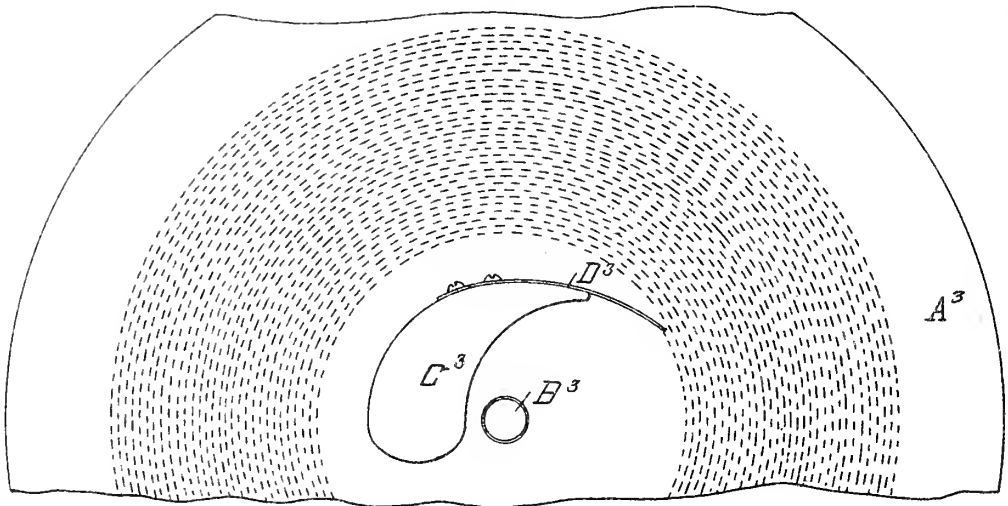


Fig. 6.



Witnesses
 William Miller
 George Hulsberg

Inventors
 William Lochmann
 Fritz Lochmann
 By W.C. Hauff
 Attorney

UNITED STATES PATENT OFFICE.

FRITZ LOCHMANN AND WILLIAM LOCHMANN, OF ZEULENRODA II, GERMANY, ASSIGNORS TO THE FIRM ORIGINAL MUSIKWERKE PAUL LOCHMANN GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, OF LEIPSIK, GERMANY.

DEVICE FOR RELEASING REPRODUCERS FROM RECORDS OF TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 778,871, dated January 3, 1905.

Application filed April 27, 1904. Serial No. 206,042.

To all whom it may concern:

Be it known that we, FRITZ LOCHMANN and WILLIAM LOCHMANN, subjects of the King of Saxony, residing at Zeulenroda II, Reuss, Germany, have invented new and useful Improvements in Devices for Releasing Reproducers from Records of Talking-Machines, of which the following is a specification.

At the close of a play, talk, or the like the reproducer or horn should be released or lifted off the record. For accomplishing this result promptly at the close of the play, even when of short duration, it has been the practice to abruptly deflect the spiral line along which are the undulations with a sharp rise toward the center. By this movement the release or clearing device for the reproducer or horn is brought into operation. This arrangement, however, has a disadvantage that the point of the reproducer does not respond to the sudden deflection and runs or jumps out of the shallow depression of the spiral groove. To avoid this objection, it is proposed according to this invention to apply an adjustable rod above the record to serve as a guide for the point of the reproducer and abruptly divert the same at the end of the play toward the center of the record, so as to bring the release for the reproducer or horn into action.

This invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the record of a talking-machine with this arrangement. Fig. 2 is a side elevation of Fig. 1. Fig. 3 is a plan view of a modification. Fig. 4 shows a modification in which the guide-finger is shown as a spring-arm contacting with the plate or disk. Fig. 5 is a side elevation of Fig. 4. Fig. 6 shows a modified form of the carrier for the guide-finger. Fig. 7 is a side elevation of Fig. 6.

The record A is provided, as known, with the spirally-arranged undulations or sound-marks. Above the axis of rotation B of the plate a disk C is to be placed which carries the adjustable rod or finger D, which serves to guide the point to direct the reproducer of

the talking-machine at the close of the piece toward the center of the driving-axle. If, for example, the point of the reproducer has finished the piece at E, the guide D is adjusted to this position and on continued rotation of record A the point of the gramophone glides along the guide toward the center of the record, and thereby moves the releasing mechanism into action, as well known.

The manner in which the guide D, forming the mechanical arrangement for releasing the reproducer, is arranged is immaterial so far as the present invention is concerned. The essence of the arrangement is that an adjustable rod or feeler is applied projected over the record. The rod must be adjustable, so that it can be set in accordance with the size of the piece being played or reproduced. To what extent it is projected over the record is immaterial.

In the example shown in Fig. 1 the rod D is applied to a plate C, slipped over the driving-axle B of record A or which can be screwed to such axle. This rod D is composed of a wire which can be straight or bent or be given a certain bend and brace by the application of a stud F. The rod D is fastened at one end to the button G, so that by turning the button the rod can be extended more or less over the plate C.

The plate C is of such size that the release mechanism of the reproducer comes into action as soon as the plate C is reached. The plate has an inclined edge H, so that the point of the reproducer can run up onto the plate even when the release device for the reproducer should not operate at once.

Fig. 3 shows another construction of rod and which is indicated by the reference character D'. It is in this case made straight and by sliding is set more or less over the surface of plate C'. The rod D' could, however, also be given any other desired form than that as shown. It can be applied directly to the button G' in any manner above the record A' without requiring the plate C'. In view of the sensitiveness of the reproducer it is ad-

visible that the rod D' should be elastic, so that on contacting with the point of the reproducer the deviation will be accomplished without injury.

5 In the form of construction shown in Figs. 4 and 5 the guide or finger D^2 is shown as a spring-arm which lies against the boundary or rim of the plate C^2 . By turning the button G^2 the arm can be caused to make more
10 or less firm contact. For this purpose the button, by means of an arm or, as shown in the drawings, by means of rotary disk I^2 , secured to the button, engages an arm K^2 of the finger D^2 . In the example shown the connection between rotary disk I^2 and arm K^2
15 is effected by pin L^2 of a pin-and-slot connection. By turning the button G^2 disk I^2 is rotated and the arm K^2 on the finger D^2 is actuated, so that said finger will swing from or
20 contact with the circumference of the disk C^2 .

In the form of construction shown in Figs. 6 and 7 in place of the ring-shaped disk a carrier C^3 is employed, carrying the finger D^3 or
formed directly into such finger. As the carrier or body C^3 is not secured to shaft B^3 , it
25 must be so heavy that its own weight will secure it against displacement. To bring the finger D^3 into position, the latter in this case is not moved on the carrier, but the entire
30 carrier or body C^3 is movably arranged on the plate A^3 . The carrier C^3 is retained on the record-disk by its own weight.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A mechanism for freeing the reproducer 35 from the record of a talking-machine, comprising an adjustable rod above the record set to correspond with the end of the piece or undulation to guide the point of the reproducer for directing the reproducer to the center 40 of the record for enabling the release to come into operation.

2. A mechanism for freeing the reproducer from the record of a talking-machine comprising a rod, a plate to which the rod is connected, and a driving-axle onto which said 45 plate is secured or slipped.

3. A mechanism for freeing the reproducer from the record of a talking-machine comprising a spring-rod, a driving-axle, and a 50 plate secured or connected to the axle and to which plate the rod is secured.

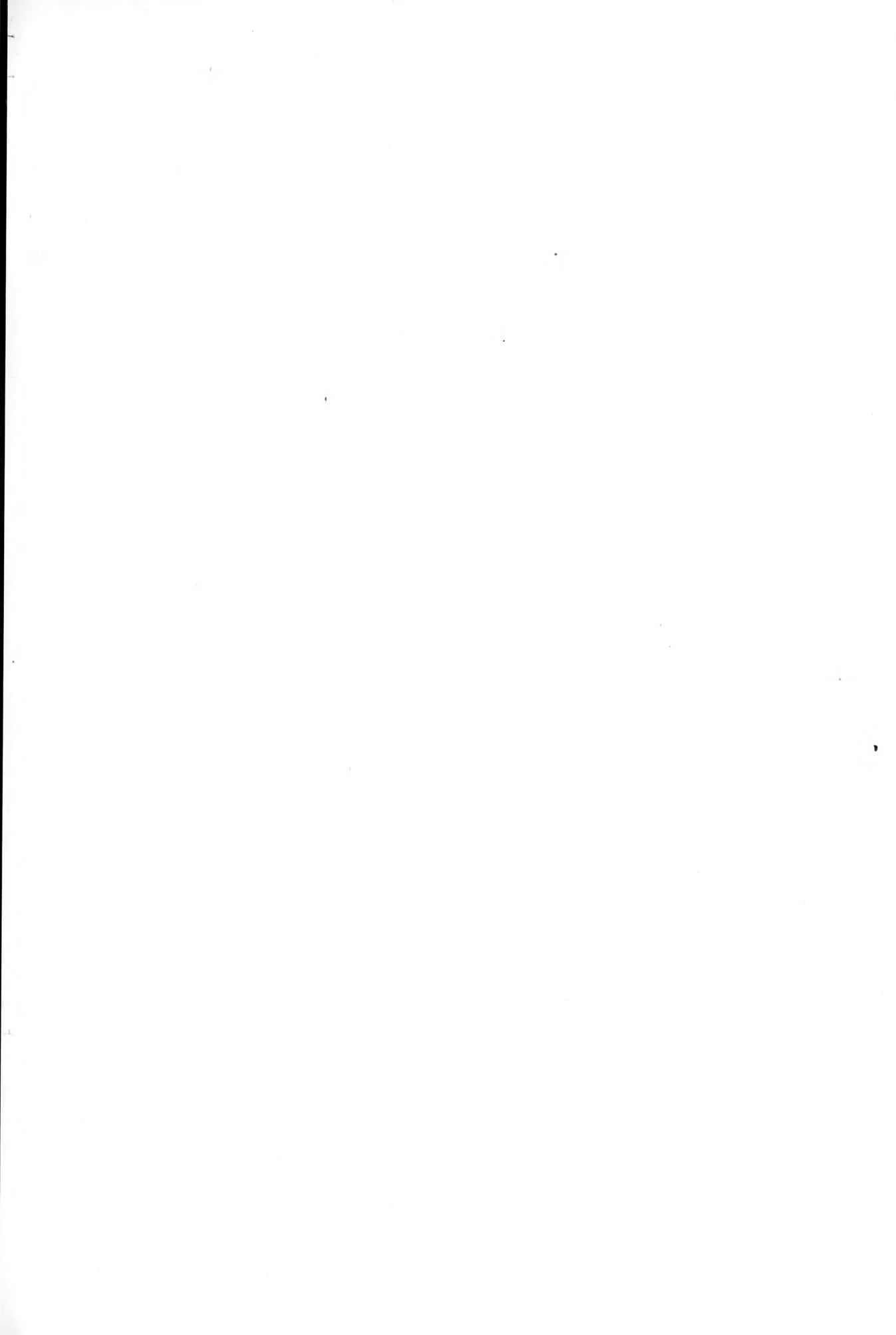
4. A mechanism for freeing the reproducer from the record of a talking-machine comprising a spring-rod, a driving-axle, and a 55 plate secured or connected to the axle and to which plate the rod is secured, said plate having a stud for enabling the rod to be braced and held at a desired bend or curvature.

In testimony whereof we have hereunto set 60 our hands in the presence of two subscribing witnesses.

FRITZ LOCHMANN.
WILLIAM LOCHMANN.

Witnesses:

HANS NEUER,
GUSTAV MÜLLER.



No. 778,975.

PATENTED JAN. 3, 1905.

E. R. JOHNSON.
CUTTING TOOL FOR SOUND RECORDING MACHINES.
APPLICATION FILED AUG. 16, 1908.

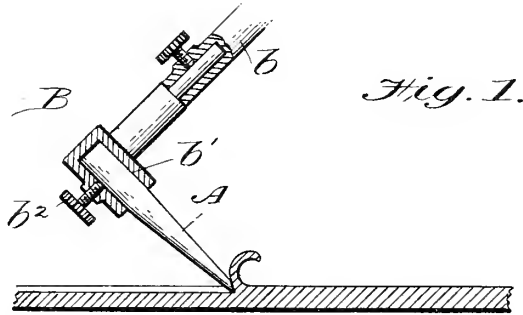


Fig. 1.

Fig. 2.

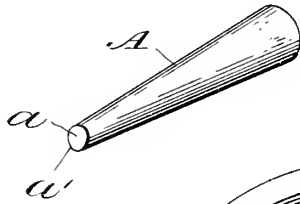


Fig. 3.

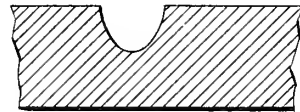


Fig. 5.

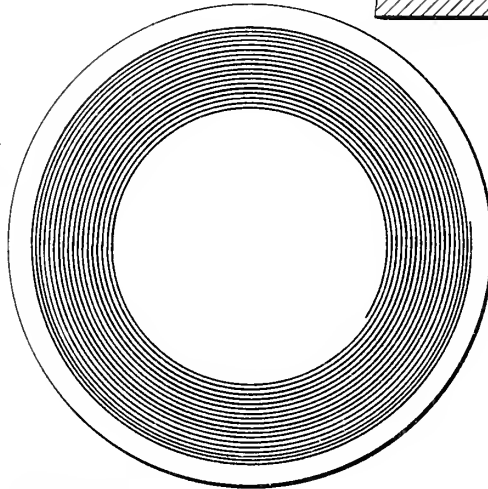


Fig. 4.

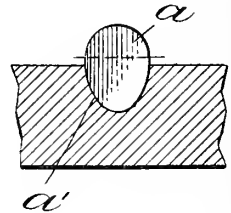


Fig. 6.



Witnesses.
J. A. Cross
Harry Miller

Inventor
Eldridge R. Johnson.
By *John Pettit*
Attorney.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

CUTTING-TOOL FOR SOUND-RECORDING MACHINES.

SPECIFICATION forming part of Letters Patent No. 778,975, dated January 3, 1905.

Application filed August 16, 1898. Serial No. 688,695.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Cutting-Tools for Sound-Recording Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention has relation to tools for cutting records in sound-recording machines; and it consists in the construction hereinafter described and claimed.

In producing records upon sound-recording machines for use upon talking-machines, such as the gramophones, where the sound-waves are recorded in the sides of the groove in the record instead of in the base, as in the type of machine of which the phonograph is an illustration, it is essential in order to produce a clear record that the material be cleanly and neatly cut from the groove in the process of recording, so that sharp well-defined lines will be formed in the walls of the groove. I have discovered that in order to produce the best results these side walls of the groove must be at a slight angle to the face of the plate or record and the groove must be widest at the mouth. Where the walls are perpendicular or slightly wider at a point below the mouth of the groove, inferior results are produced, and the record is by no means as durable.

The object of my present invention is to provide a cutting-tool for cutting grooves in wax or other suitable material for recording sound-waves of the construction above referred to, my aim being to provide a tool of microscopic proportions peculiarly formed with a flat face of substantially oval form, the edges of the oval being cutting edges to cleanly cut the material from the resultant groove, leaving sharp smooth well-defined edges, the flat face being preferably obliquely disposed to the axial line of the tool, so that when in position in operation to present a cutting-face substantially perpendicular.

It is clear that my invention may also be

applicable to other constructions of recording-machines than that hereinbefore more particularly referred to.

In the accompanying drawings, which illustrate my invention and the application thereof on an enlarged scale, Figure 1 is a partially-sectional view representing my improved tool in position attached to the stylus-bar of the stylus or tool of a sound-recording machine in the process of cutting a recording-groove upon a plate of wax or other semiplastic material. Fig. 2 is a perspective view of the cutting-tool detached. Fig. 3 is an enlarged cross-sectional view of a recording-plate, showing the walls of the groove as formed by my improved cutting-tool. Fig. 4 is a similar view illustrating the face of the cutting-tool in position in the groove. Fig. 5 is a plan view of a recording-plate of circular form with the recording-grooves provided in the face thereof. Fig. 6 illustrates to an exaggerated extent a section of a record-groove with the lines of the sound-waves in the sides thereof.

A represents the cutting-tool, secured upon the end of the stylus-bar *b* through the medium of the T-shaped section B, the upper end of the tool A being secured in the orifice *b'* of the section B through the medium of the thumb-screw *b²*.

The tool A is necessarily for the purposes of illustration very much enlarged in the drawings, as in practice the cutting-face of the instrument is preferably reduced to two and a half one-thousandths of an inch in its largest diameter, and the greatest care must be observed in the preparation of the cutting-face. The tool A is preferably conical, being at the upper end of a suitable diameter to be evenly held in the stylus-section B through the medium of the thumb-screw *b²* and gradually reduced to or near the cutting-face *a* to a diameter of about two and a half one-thousandths of an inch. The face *a* is cut and formed, preferably, at an angle to the axial line of the tool A, so that when the tool is in position in operation at about the angle illustrated in Fig. 1 the cutting-face will assume an angle

substantially vertical or at about a right angle to the face of the plate upon which the record is being produced. The edges a' of the cutting-face form, preferably, substantially an ellipse. These edges a' are carefully formed to present a cutting edge, so that as the moving record is traveled against the face a of the tool A when held in position, as indicated in Fig. 1, the knife-edges a' will cleanly cut the material from the record, forming a clean-cut groove, with the undulation or sound-waves produced by the vibration of the stylus formed in the record, as shown in Fig. 5 and illustrated in cross-section in Fig. 3. The shape of the face a is preferably the resultant of a cone intersected by a plane at an angle to its axis.

In operation any suitable means are provided for preventing the cutting-tool from entering the wax beyond the line, as approximately indicated in Figs. 1, 3, and 4. The tool should enter to a line slightly below the greatest diameter of the face a , as indicated in Fig. 4. It is understood that in reproducing the record thus formed may be used for reproducing purposes directly, or a more du-

rable and indestructible record may be reproduced by various processes from the original record. This feature, however, forms no part of my present invention herein described. 30

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

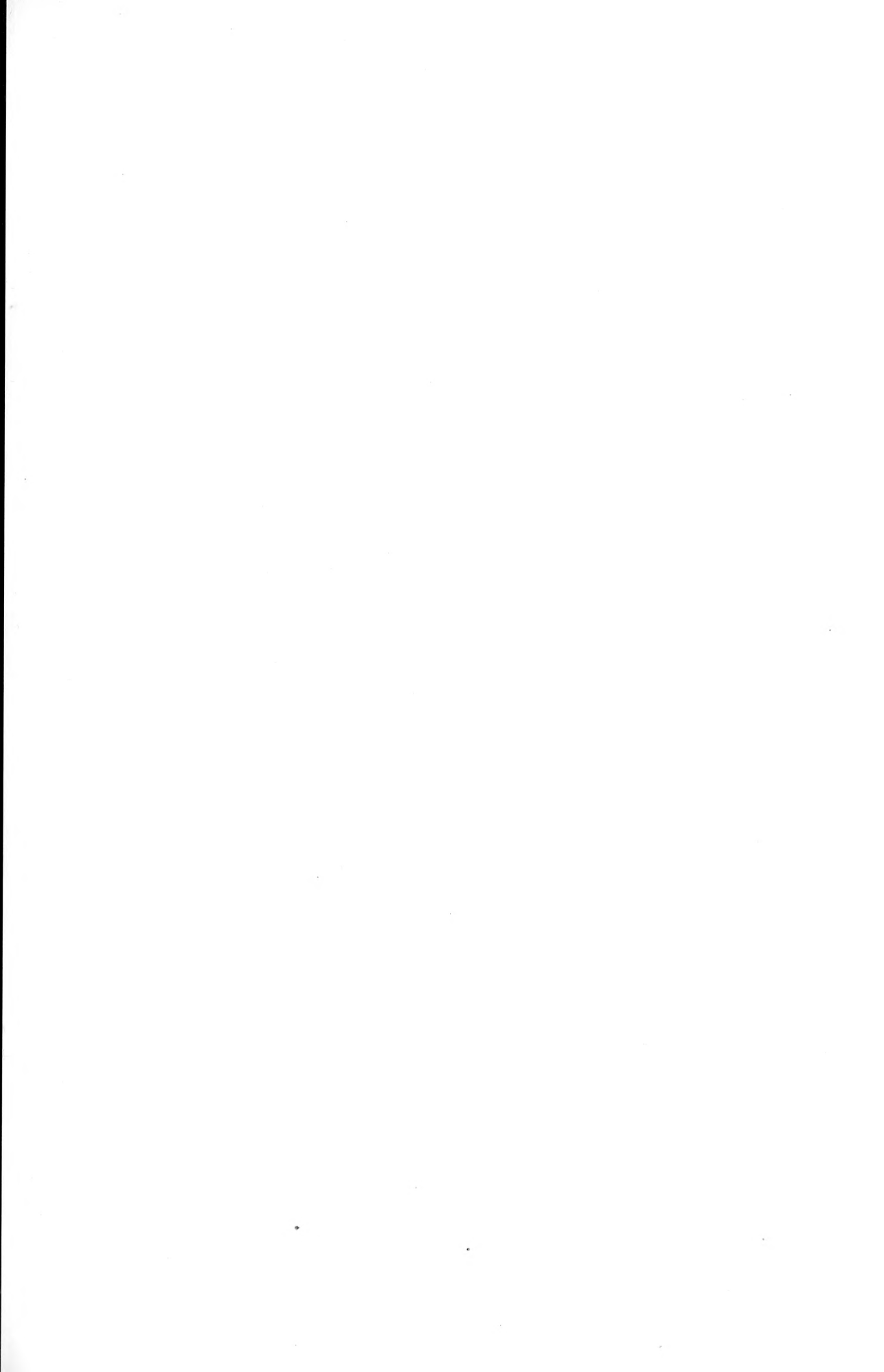
In a sound-recording machine, a cutting-tool comprising a needle having a conical end portion terminating in a surface having the form of a conic section taken at an angle to the axis of the needle, the surface of the conic section being at such an angle to the axis that when the needle is in the correct relation to a recording-surface, the former will be substantially perpendicular to said recording-surface and whereby chips of material will be deflected from the groove and the free cutting side edges of the conic section will have free and untrammelled action, substantially as described. 45

In witness whereof I have hereunto set my hand this 12th day of August, A. D. 1898.

ELDRIDGE R. JOHNSON,

Witnesses:

BENJ. F. PERKINS,
HORACE PETTIT.



E. R. JOHNSON.
METHOD OF AFFIXING TABLETS TO SOUND RECORDS.
APPLICATION FILED OCT. 22, 1903.

Fig. 1.

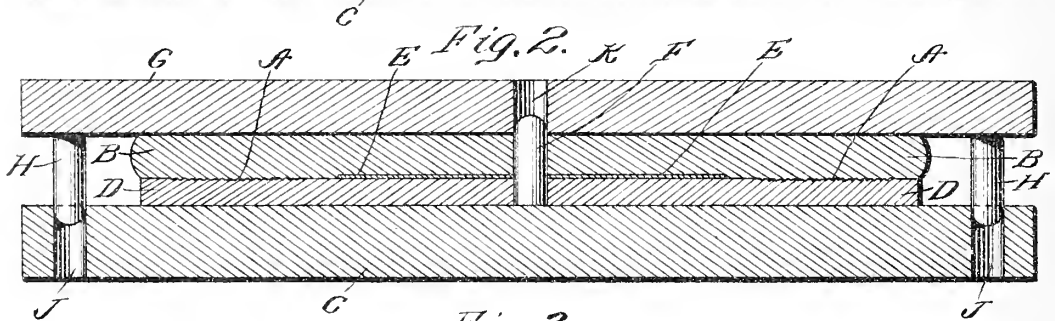
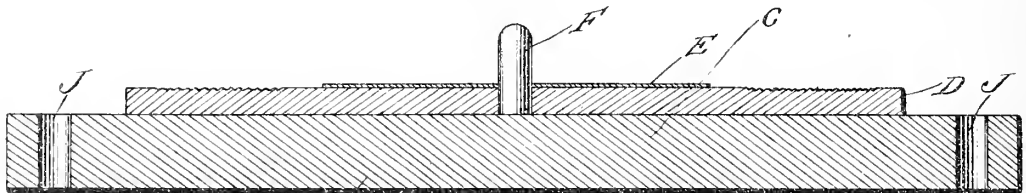
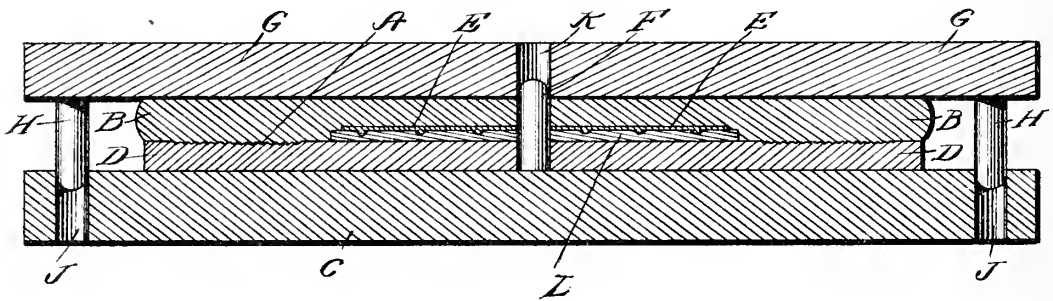


Fig. 3.



Fig. 4.



WITNESSES:
H. J. Hartman.
Edu. W. Vaill jr.

INVENTOR
Eldridge R. Johnson.
BY
Horace Pettit
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

METHOD OF AFFIXING TABLETS TO SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 778,976, dated January 3, 1905.

Application filed October 22, 1903. Serial No. 177,998.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Methods of Affixing Tablets to Sound-Records, and particularly to Flat Disk Records, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide a method by which these tablets can be affixed to sound-records in an inexpensive and convenient manner and which when so affixed will not project beyond the surface thereof and will afford means for carrying identifying marks or characters contrasting in such a manner with the sound-record as to be easily and readily legible.

In United States Letters Patent No. 739,318, granted September 22, 1903, for sound-record upon an application made by myself is shown a sound-record and affixed tablet made by the method forming the subject of this application.

In the accompanying drawings I have shown one form of apparatus by means of which my method can be practiced, although it is to be understood that other apparatus may be employed, since this apparatus is selected as a good example for the purpose of illustrating my novel method.

In said drawings, Figure 1 is a view in perspective, showing the manner in which the lower die-plate, matrix, and tablet are assembled. Fig. 2 is a sectional view of the various parts assembled between the upper and lower die-plate in affixing the tablet according to my method. Fig. 3 is a central sectional elevation of the record with the tablet applied thereto. Fig. 4 is a central sectional elevation of the various parts assembled as in Fig. 2 when a tablet-plate is employed.

The material of which a sound-record is made, as is well known, softens under the application of heat, and in this method I make use of this property of the material—that is to say, I soften a sound-record by the application of heat—and while the same is in a semi-

plastic or gelatinous state I impress into the surface thereof a tablet, so that when the record hardens after the withdrawal of the heat said tablet is wholly within the confines of the record, or, in other words, is flush with or below the surface of the record, and as a further step of my method, although my invention is not limited thereto, I make use of the adhesive character of the material composing the sound-record when the same is softened by the application of heat, so that by impressing the tablet into the surface thereof and into intimate contact with the plastic or gelatinous record it adheres thereto without the employment of other adhesive means.

It is well known that the record-grooves A of the sound-record disk B, Fig. 3, are made by assembling the material forming the record, which has been previously heated and rendered plastic, with a matrix and subjecting the same to pressure, and my method can be carried out at the same time. For instance, in Fig. 1 I show a lower die-plate C and a matrix D thereon, while upon the central portion of the matrix is the tablet E, which it is desired to affix to the sound-record by my method, the centering-pin F, rising from the lower die-plate C, passing through the matrix D and tablet E.

A layer of material of which the record is formed having been heated and rendered plastic is placed upon the matrix and tablet, as shown at B in Fig. 2, and then the upper die-plate G is placed upon the plastic material, being held in place by the dowel-pins H entering sockets J in the lower die-plate C, the centering-pin F passing into an opening K in the upper die-plate G. When thus assembled, these parts are subjected to pressure in a suitable press, and after being removed therefrom and separated the record-grooves are impressed into the sound-record. The tablet E is also impressed into the surface of said sound-record and is permanently affixed thereto, either flush or below the surface thereof.

In practicing the method as above described the face of the tablet is practically flush with

the face of the record; but I also in some cases depress the tablet-surface below that of the record, as illustrated in Fig. 4. In this case in assembling the parts a tablet-plate L, having a central opening for the centering-pin, is placed upon the matrix, and the tablet-plate E upon said plate L, with the face of the latter next to the tablet either plain, embossed, or engraved, as shown in Fig. 4, in which latter case the tablet so depressed would likewise be engraved or embossed. When the parts thus assembled are subjected to pressure, the tablet-plate L depresses the tablet E below the surface of the record B, whereby in use the tablet is protected.

It is obvious that the shape of the tablet is immaterial and that it may be made of various materials—for instance, paper or any other suitable material—and that the identifying-marks can be applied thereto in any manner desired.

Having thus described my invention, what I claim, and desire to protect by Letters Patent of the United States, is—

1. The herein-described method of affixing a tablet to a sound-record, composed of a material, which softens under the application of heat, which consists in softening the record by the application of heat, and impressing a tablet into the surface thereof.

2. The herein-described method of affixing a tablet to a sound-record composed of a material which softens and becomes adhesive under the application of heat, which consists in softening and making the record adhesive by the application of heat, and impressing a tablet into the surface thereof.

3. The herein-described method of affixing a tablet to a sound-record composed of a material, which is gelatinous when heated and hardens when cold, which consists in heating the said disk and impressing a tablet into the

surface thereof to be held therein solely by the adhesion of such material.

4. The hereinbefore-described method of affixing tablets to record-disks, which comprises the following steps: first, interposing a tablet between the matrix and the plastic material from which the record is to be formed; second, forcing the material into intimate contact with the matrix and tablet by subjecting the same to pressure.

5. The hereinbefore-described method of affixing tablets to record-disks, which comprises the following steps: first, interposing a tablet and a tablet-plate between the matrix and the plastic material from which the record is to be formed; second, forcing the material into intimate contact with the matrix and tablet by subjecting the same to pressure.

6. The hereinbefore-described method of affixing tablets to record-disks, which comprises the following steps: first, interposing a tablet and an engraved tablet-plate between the matrix and the plastic material from which the record is to be formed; second, forcing the material into intimate contact with the matrix and tablet by subjecting the same to pressure.

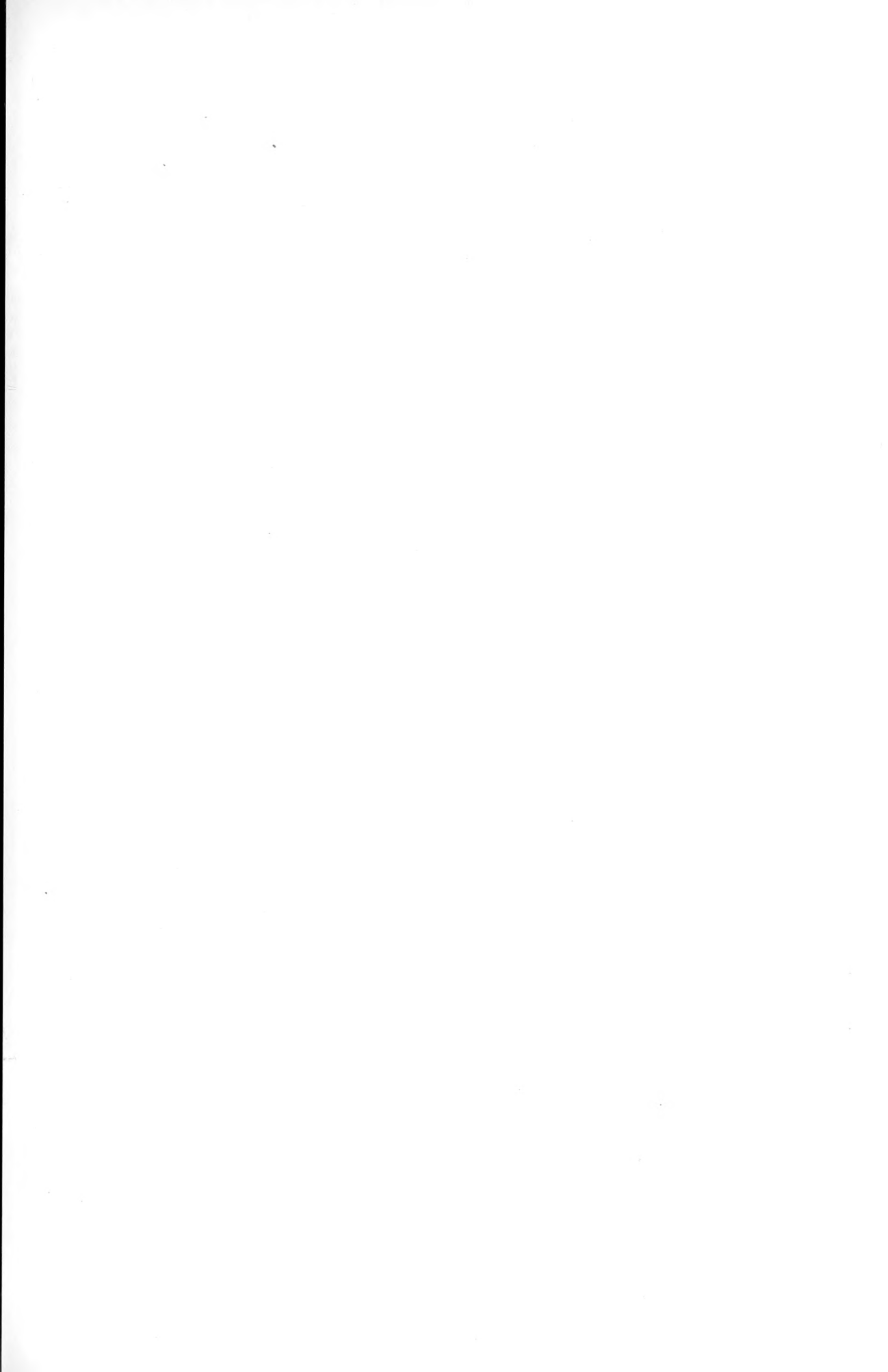
7. The hereinbefore-described method of labeling sound-record disks, which comprises the following steps: first, interposing a tablet-plate between the matrix and the plastic material from which the record is to be formed; second, forcing the material into intimate contact with the matrix and the tablet-plate by subjecting the same to pressure.

In witness whereof I have hereunto set my hand this 6th day of October, A. D. 1903.

ELDRIDGE R. JOHNSON.

Witnesses:

LEWIS H. VAN DUSEN,
CHAS. K. BENNETT.



L. F. DOUGLASS.
CABINET FOR TALKING MACHINES.
APPLICATION FILED SEPT. 21, 1903.

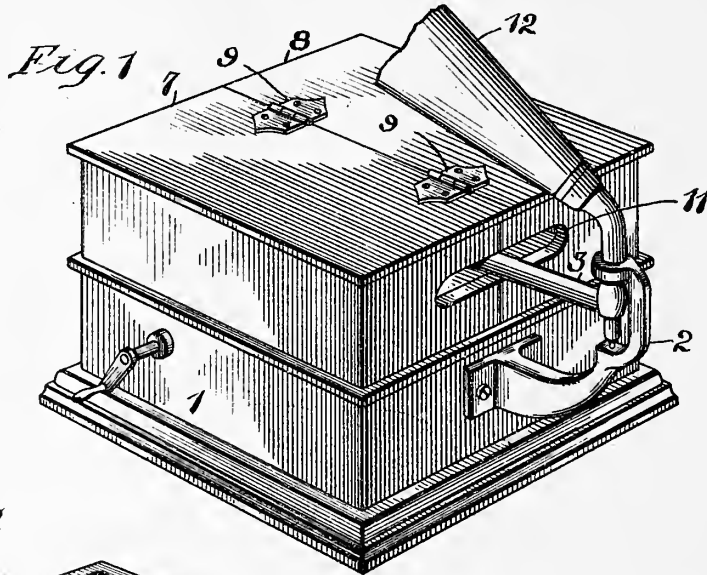


Fig. 2

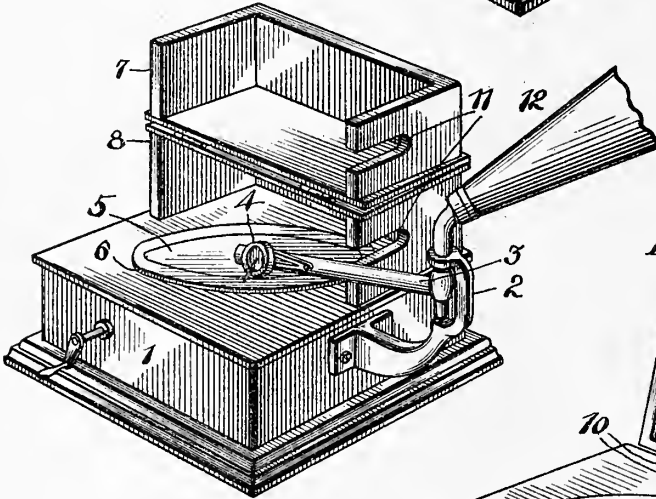
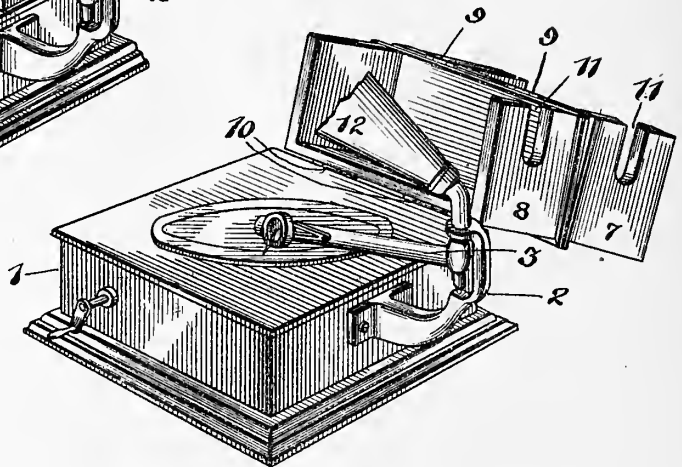


Fig. 3



WITNESSES:

F. J. Hartman
Chas. Bennett

INVENTOR

Leon F. Douglass.

BY

Home Lett's.
ATTORNEY.

UNITED STATES PATENT OFFICE.

LEON F. DOUGLASS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

CABINET FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 779,030, dated January 3, 1905.

Application filed September 21, 1903. Serial No. 174,014.

To all whom it may concern:

Be it known that I, LEON F. DOUGLASS, a citizen of the United States, and a resident of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Cabinets for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide a talking-machine cabinet within which the principal parts of the talking-machine may be inclosed when the machine is not in use and also within which the sound-producing parts of the machine may be inclosed when the machine is in operation, so as not only to prevent the delicate parts from becoming injured, but also to prevent superfluous and disagreeable sounds from mingling with the vibrations produced by the talking-machine.

In general my invention consists in placing a casing upon the top of the usual motor casing or box, said upper casing being divided centrally, so that one part will turn or swing back upon the other, and being provided with a slot within which the arm of the talking-machine is adapted to freely reciprocate.

For a full, clear, and exact description of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 shows a perspective view of my improved cabinet, the parts of the casing being closed. Fig. 2 is a perspective view similar to Fig. 1, but showing the front part of the casing turned back. Fig. 3 is a perspective view showing the upper part of the casing entirely removed.

Referring to the drawings, the numeral 1 indicates the usual casing for the talking-machine motor, which has attached at one side thereof the bracket or supporting-arm 2. This bracket 2 is adapted to support and form a vertical bearing for the hollow arm 3 of the talking-machine proper. The inner end of the arm 3 carries a vertically-pivoted sound-box 4, which is adapted to coöperate with the sound-record 5, carried upon the turn-table 6, the latter being rotated by the usual spring-motor within the casing 1.

The numerals 7 and 8 represent two similar rectangular portions of a casing or cover which rests upon the top of the motor-casing 1 and are hinged together at their inner edges by the hinges 9. The rear portion 8 of this casing is also hinged to the motor-casing 1, as shown at 10. In the adjacent vertical sides of each of the parts 7 and 8 of the removable casing are provided openings 11, which when the casing is closed form a continuous slot within which the arm 3 may oscillate when the casing is closed, as shown in Fig. 1. This slot is made of sufficient length to allow the arm to swing to the extreme limits of the path within which the stylus or needle of the sound-box travels when the machine is in operation.

In operation the casing is first opened, as shown in Fig. 2, which allows the sound-record to be placed upon the turn-table, the needle of the sound-box to be adjusted to its groove, and the motor to be started. The casing is then closed or placed in a position shown in Fig. 1, after which the machine is allowed to operate in the usual manner until the particular selection contained in the record is finished. The casing is then manipulated in a manner reverse to that above described.

If it is desired to have the top of the motor-casing 1 completely free and unobstructed, the whole casing may be thrown back, as shown in Fig. 3, which allows the turn-table and any other of the upper parts of the motor-casing to be made easily accessible. The amplifying-horn 12 being pivoted on the support or bracket 2, the same may be turned in any direction to throw the sound wherever desired and also may be moved to extend outwardly, as shown in Fig. 2, so that the portions of the casing 7 and 8 may be swung backward without interfering with said horn.

By providing a casing such as above described the operative parts of the machine which produce the sound are not only protected and kept free from dust at all times, but when the machine is in operation the disagreeable noises or sounds which may sometimes be produced by the sound-box or by the needle passing over the material of the record are obviated and made unobjectionable.

The casing when closed has a neat and attractive appearance and is adapted to be placed in a parlor or drawing-room with the same pleasing effect as is produced by other kinds of music-boxes.

Having thus described the nature of my invention, what I claim, and desire to protect by Letters Patent of the United States, is—

1. In a cabinet for talking-machines, comprising a motor-casing, a removable cover or casing carried by said motor-casing and having an opening therein, reproducing mechanism supported outside of and passing through said opening and means to allow the removal of said cover without displacing said reproducing mechanism.

2. A cabinet for talking-machines, comprising a motor-casing, a removable cover or casing carried by said motor-casing and having a slot therein, reproducing mechanism supported outside of said cover and passing through said slot, the cover being made in parts so as to allow said reproducing mechanism to remain undisturbed when said cover having the slot is removed.

3. In a cabinet for talking-machines comprising a motor-casing, a removable cover or casing carried by said motor-casing and having a slot therein, reproducing mechanism

supported outside of said cover by the motor-casing and passing through said slot, the cover being divided through said slot so as to provide an outlet from said slot so that said cover may be removed without displacing the reproducing mechanism.

4. A cabinet for talking-machines, comprising a motor-casing, a divided removable casing mounted upon said motor-casing, the parts of said divided casing having corresponding openings forming a slot to allow of the oscillation of the sound-box supporting-arm therein.

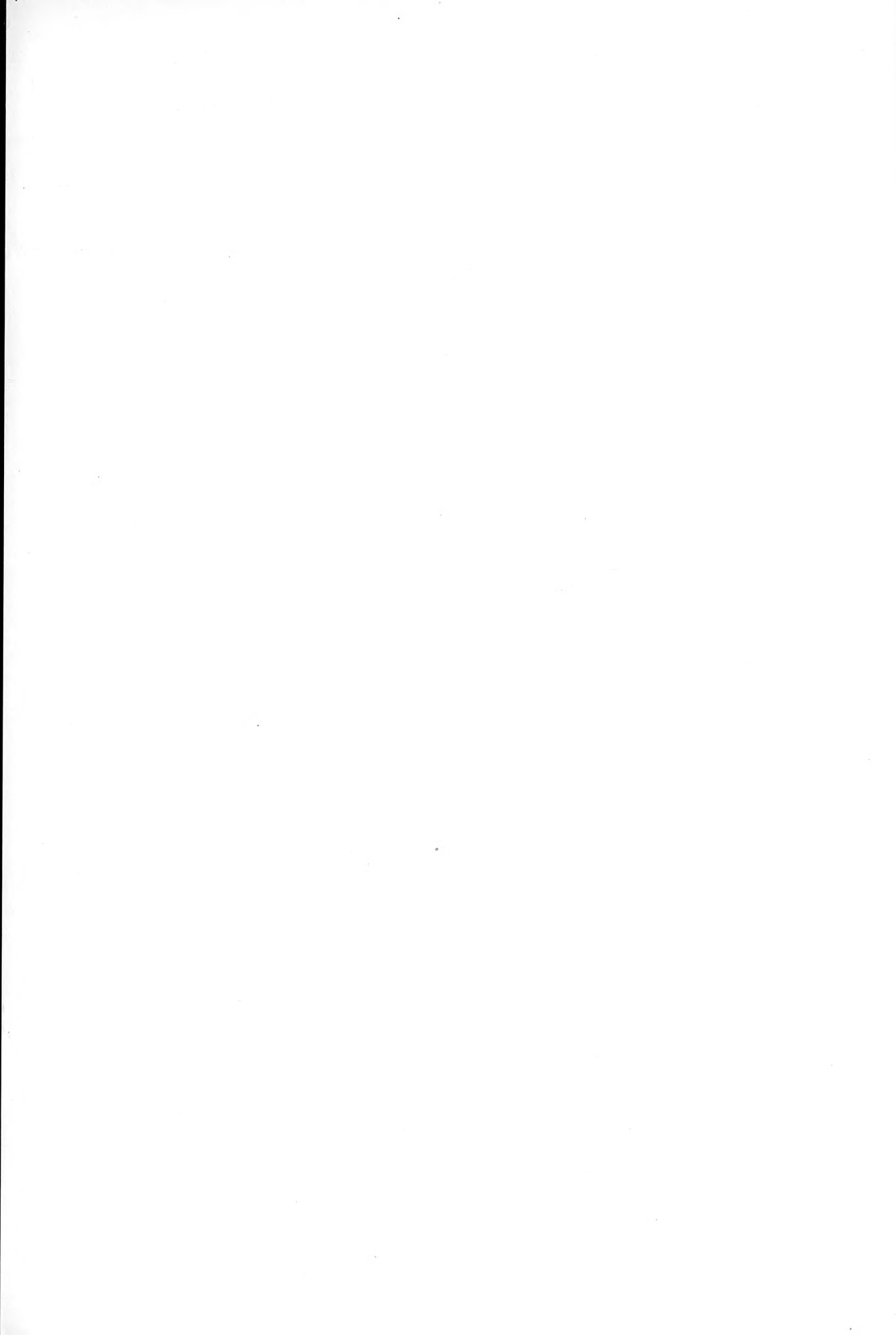
5. A cabinet for talking-machines, comprising a motor-casing, a centrally-divided removable casing hinged to said motor-casing, pivoted connections for the sections of said divided casing and corresponding elongated openings in the side of the said divided casing which form a slot when the casing is closed within which the sound-box supporting-arm of the talking-machine may oscillate.

In witness whereof I have hereunto set my hand this 2d day of September, 1903.

LEON F. DOUGLASS.

Witnesses:

R. E. KLENCK,
PETER HACEGALUP.



No. 779,033.

PATENTED JAN. 3, 1905.

C. J. EICHHORN.
AMPLIFYING HORN.
APPLICATION FILED APR. 27, 1904.

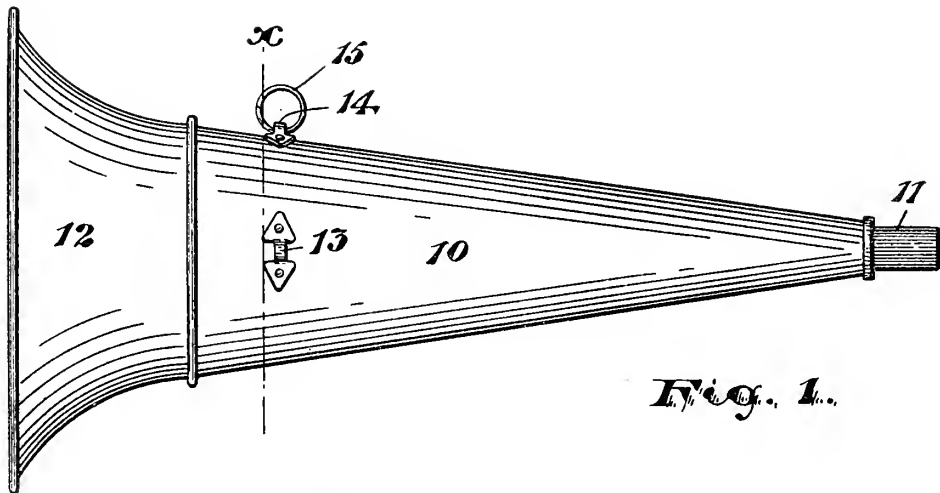


Fig. 1.

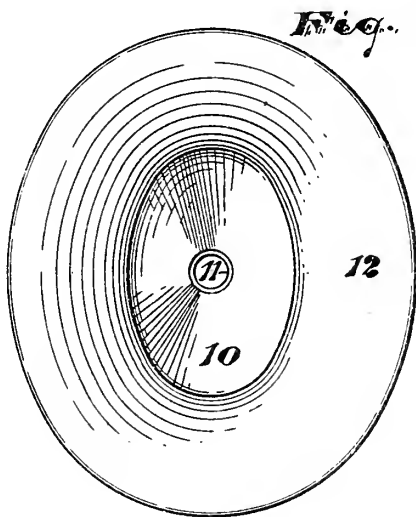


Fig. 2.

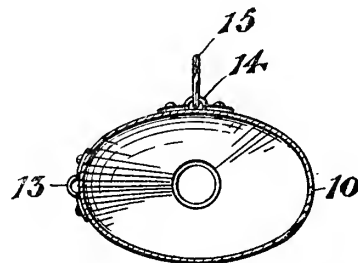


Fig. 3.

WITNESSES:

Ralph Lancaster

Russell M. Everett

INVENTOR:

Charles J. Eichhorn,

BY

Charles H. Bell

ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES J. EICHHORN, OF NEWARK, NEW JERSEY.

AMPLIFYING-HORN.

SPECIFICATION forming part of Letters Patent No. 779,033, dated January 3, 1905.

Application filed April 27, 1904. Serial No. 205,175.

To all whom it may concern:

Be it known that I, CHARLES J. EICHHORN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Amplifying-Horns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

The objects of this invention are to direct the amplified sound-waves from a talking-machine in accordance with the desire of the operator and the peculiar conditions of the room, whereby the amplified sound may be thrown or centered to that part of the room where the auditors are assembled or stationed, thereby enabling articulations of a reproduced speech or song to be more perfectly understood and the reproductions be rendered more agreeable and pleasing to the said auditors.

A further object is to provide a horn which can be changed in position to give different sound effects from a given machine without removing the horn from the speaker or reproducer and to secure other advantages and results, some of which may be hereinafter referred to in connection with the description of the working parts.

The invention consists in the improved amplifying-horn and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth and finally embraced in the causes of the claim.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of the improved amplifying-horn. Fig. 2 is an end view of the same. Fig. 3 is a section taken on line *x*, Fig. 1.

In said drawings, 10 indicated the body of the horn, having a small cylindrical end 11, adapted to be coupled to the speaker of a sound-reproducing machine in any suitable manner. 12 is the bell end of the horn. Said

horn may be of sheet metal, paper, or any other suitable material. Heretofore horns for talking-machines, &c., have been circular in cross-section or end elevation, and so have directed the amplified sound-waves uniformly in all directions from the longitudinal axis of the horn. In my improved construction the horn is made oval or elliptical in cross-section, as shown in Figs. 2 and 3, both at the bell end and along the body thereof, the body at the small end gradually changing from a circle to an ellipse. Thus constructed the sound-rays are directed over an oblong area, and thus should the oblong horn be disposed vertically, as shown in Fig. 2, the rays are directed toward the vertical plane of the axis of the horn, and in this relation the horn is adapted to concentrate or direct the sound to a selected portion of the hall or room where an audience may be gathered, or should I prefer to spread the sound horizontally over the said hall and prevent much of the sound rising toward a high ceiling, where it would be lost to the auditors, I may simply turn the horn on its axis to a horizontal position without detaching it from the machine, and thus adjusted the sound will be concentrated horizontally, so that the sound rays or waves may be more perfectly audible to the listeners.

The body of the horn is provided with two eyelets 13 14, preferably soldered or riveted thereto, one of the eyelets being in the plane of the shortest diameter of the horn and the other in the plane of the longest diameter of the horn, and to said eyelets a suspensory device, such as the ring 15, may be detachably secured.

In practice the operation of the horn is such as is common to all horns of this class, with the exception that the sound-rays are differently directed, as above explained, and the sound thereof modified accordingly.

Having thus fully described the invention, what I claim as new is—

1. The improved amplifying-horn herein described, comprising a flaring body which is oval or elliptical in cross-section, the said body being provided with two eyelets, one of

which is in the longer and the other in the shorter diametrical plane of the said body.

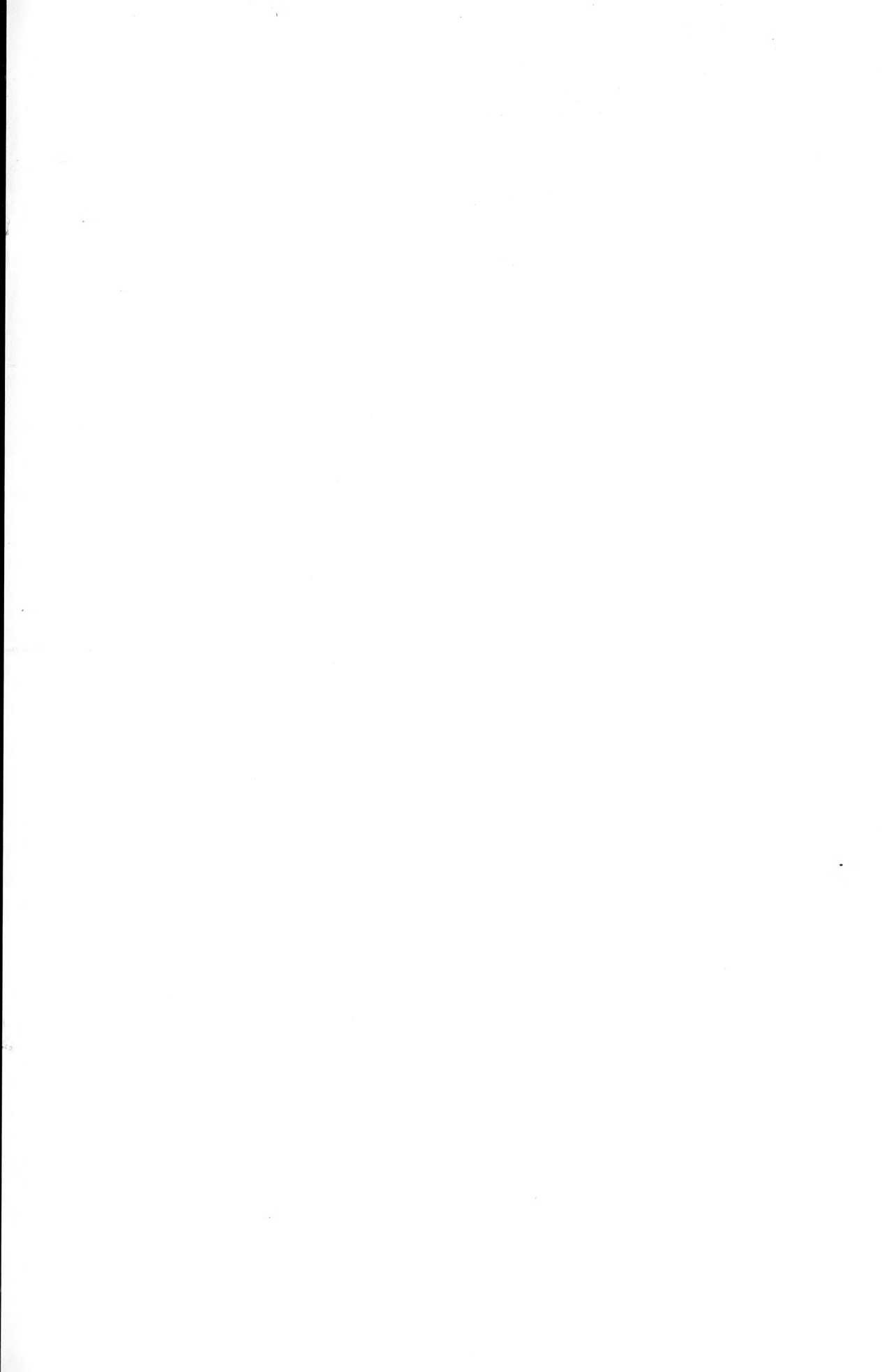
2. The improved amplifying-horn herein described, having a round small end and an oval
5 large end, the said body being provided with suspensory means in its longer and shorter diametrical planes, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my name this 18th day of April, 1904.

CHARLES J. EICHHORN.

Witnesses:

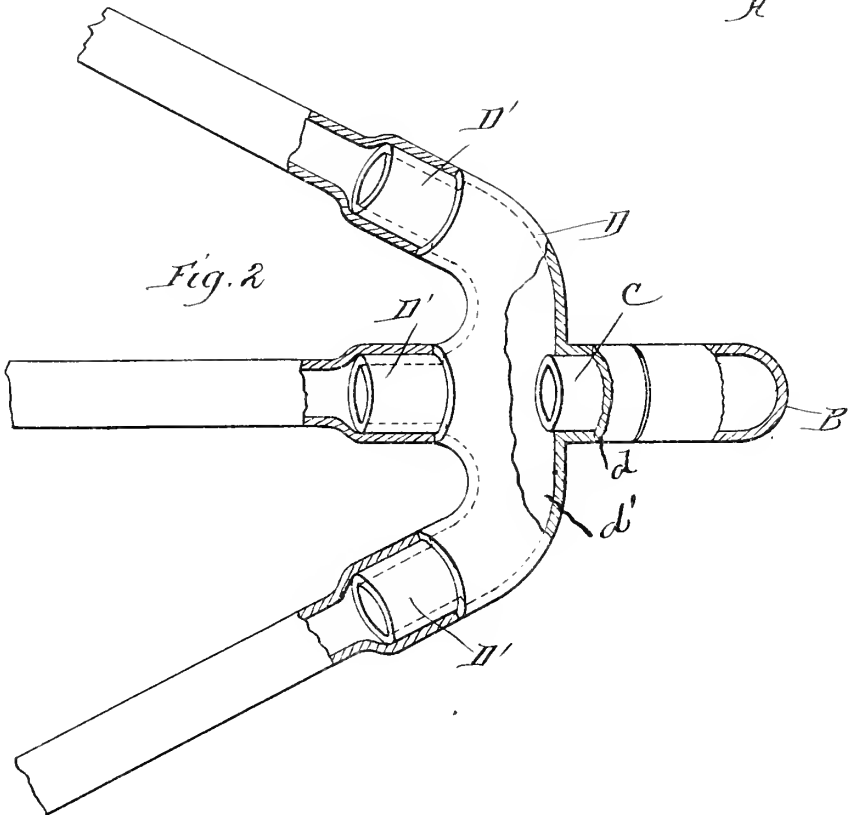
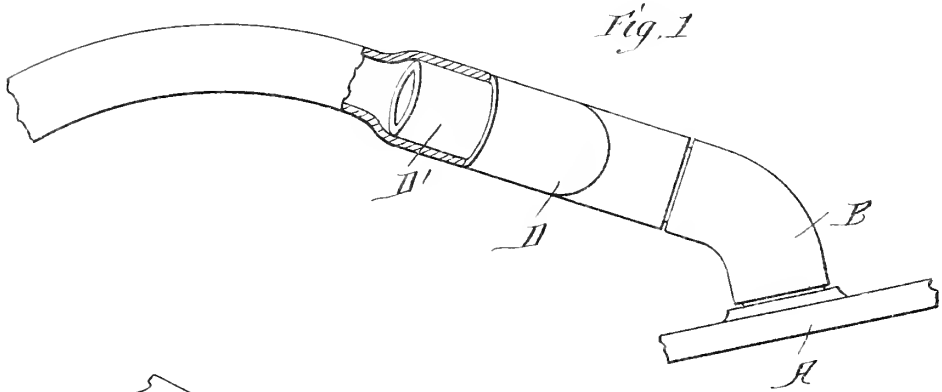
CHARLES H. PELL,
RUSSELL M. EVERETT.



No. 780,171.

PATENTED JAN. 17, 1905.

F. C. HASSETT.
ATTACHMENT FOR TALKING MACHINES.
APPLICATION FILED JUNE 30, 1903.



Witnesses:

Louis D. Heinrichs
L. H. Morrison

Inventor
Frank C. Hassett.

By *W. J. Williamson*
Att'y.

UNITED STATES PATENT OFFICE.

FRANK C. HASSETT, OF KELSO, WASHINGTON.

ATTACHMENT FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 780,171, dated January 17, 1905.

Application filed June 30, 1903. Serial No. 163,821.

To all whom it may concern:

Be it known that I, FRANK C. HASSETT, a citizen of the United States, residing at Kelso, county of Cowlitz, and State of Washington, have invented a certain new and useful Improvement in Attachments for Talking-Machines, of which the following is a specification.

My invention relates to a new and useful improvement in attachment for talking-machines, and has for its object to provide an attachment to be removably secured to the sound-box of a talking-machine having two or more branches to which two or more horns or tubes may be attached for conveying the sound to different portions of the room or to different persons.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claim.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of the attachment attached to a sound-box; Fig. 2, a plan view of the same, portions being broken away.

A represents the sound-box of the talking-machine. B is an elbow connected to the same, the forward end of this elbow being reduced, as shown at C.

D is the attachment, having a socket *d*, adapted to be slipped on the reduced portion of the elbow B. The elbow projects slightly within the elevated chamber *d'*, and the attachment D is provided with two or more branches, each of which terminates in the reduced portion *D'*, upon which the horns or tubes may be secured. The branches of the attachment D communicate with the elongated

chamber and extend out at angles from one another, so that when the horns are attached the sound may be thrown to different portions of the room, so that the whole audience can hear the machine distinctly.

This attachment will be of great advantage in giving entertainments to large audiences, as it has been observed that where only one large horn is used people sitting at the extreme of either side of the room cannot hear the machine distinctly, and in some cases not at all. With this attachment the branches may be formed at any angle, so that the sound can be thrown in all directions, and when the attachment is not desired to be used with horns tubes may be connected for conveying the sound to different persons.

Of course I do not wish to be limited to the exact construction here shown, as slight modifications could be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is—

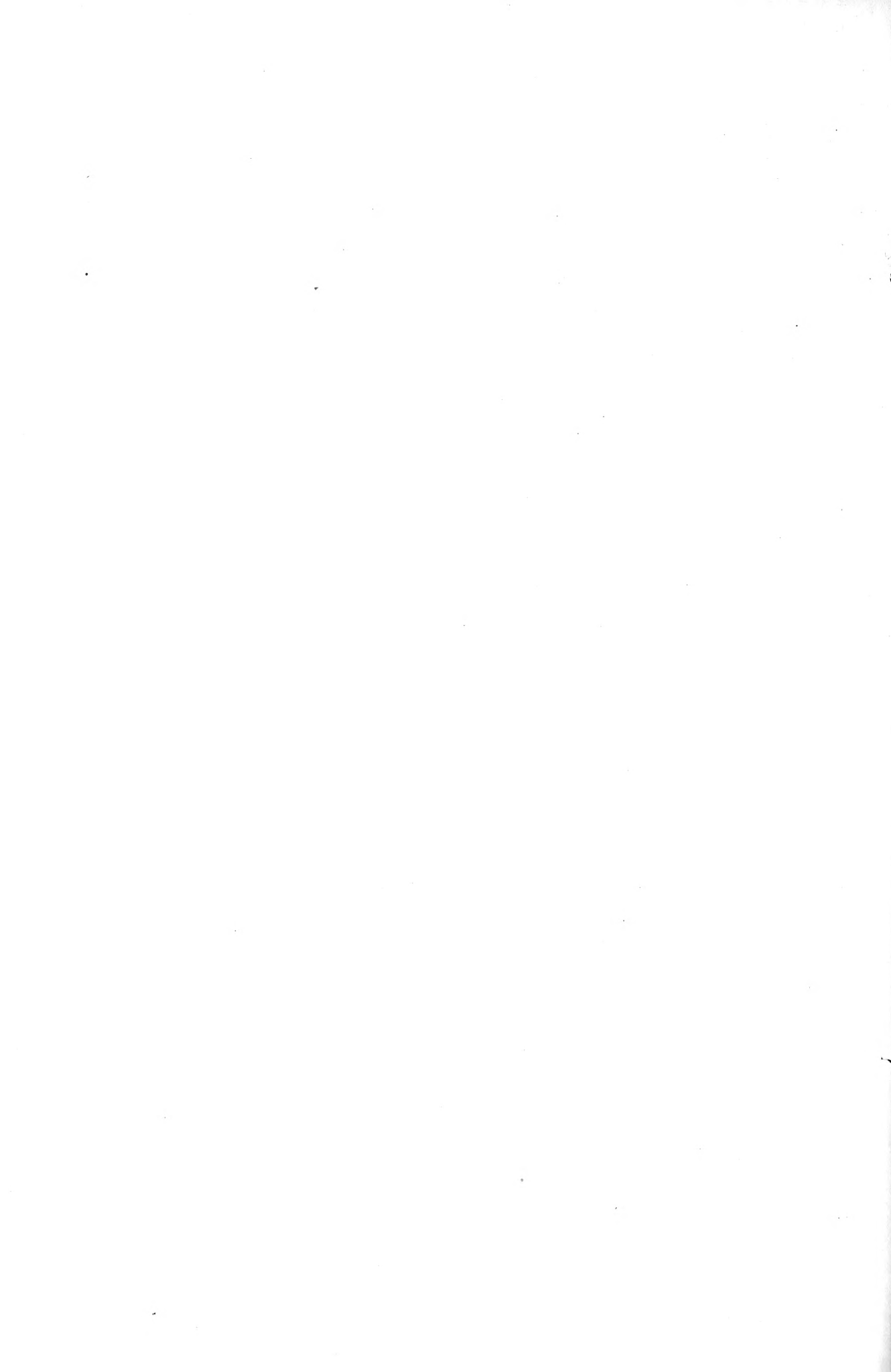
In a talking-machine, an elbow having a reduced end and a shoulder at the junction of the main and reduced portions, an attachment having a curved rear wall terminating at each end in a branch, a socket projecting from the rear wall of the chamber fitting on the reduced portion of the elbow and the said elbow projecting into the chamber of the attachment, the inner wall of said elbow being uninterrupted from the sound-box to its discharging end, and a branch formed on the front wall of the attachment opposite the elbow, the end of all the branches being reduced, as and for the purpose described.

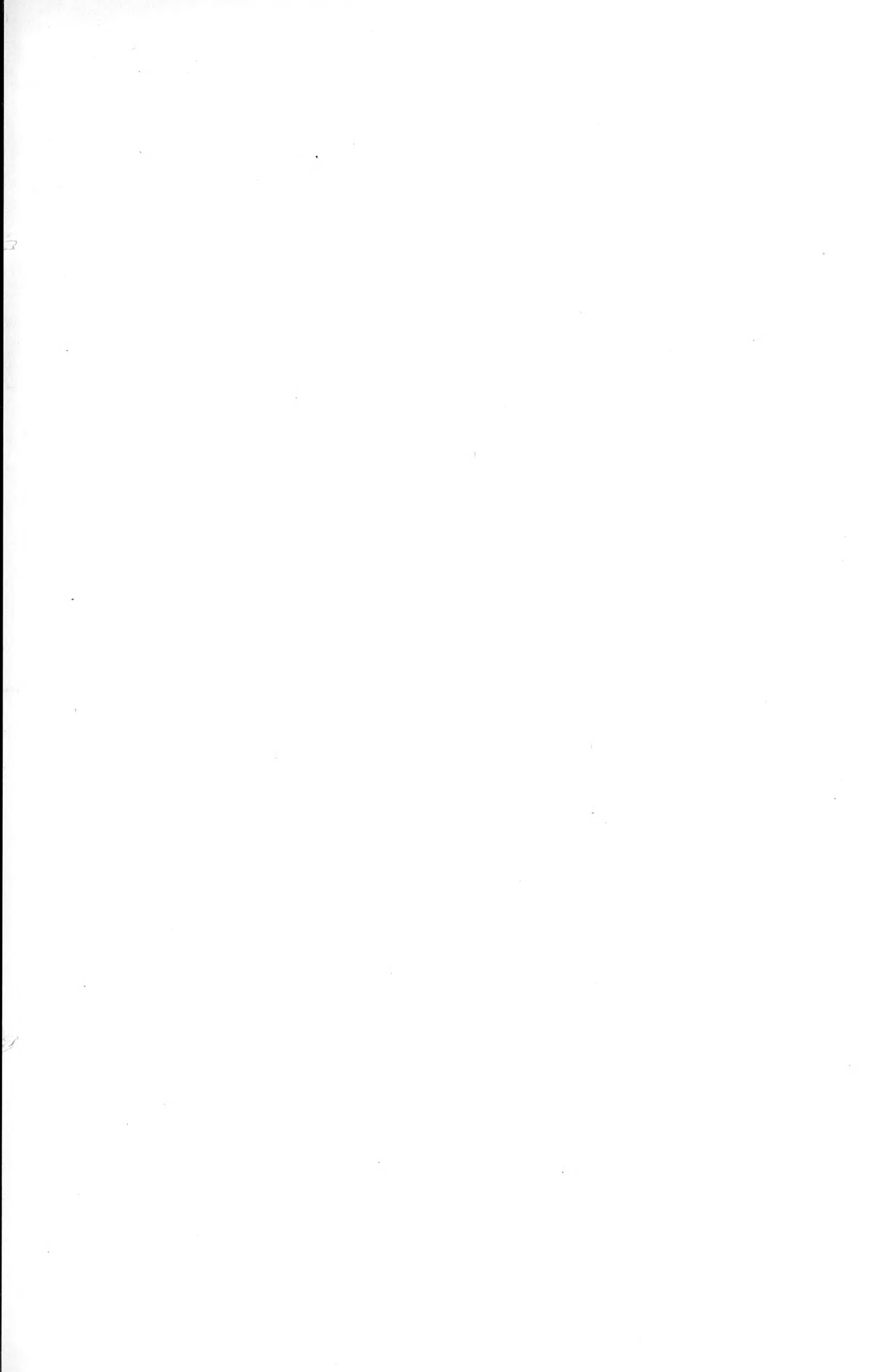
In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

FRANK C. HASSETT

Witnesses:

GEO. P. MILLAR,
J. W. HALL.



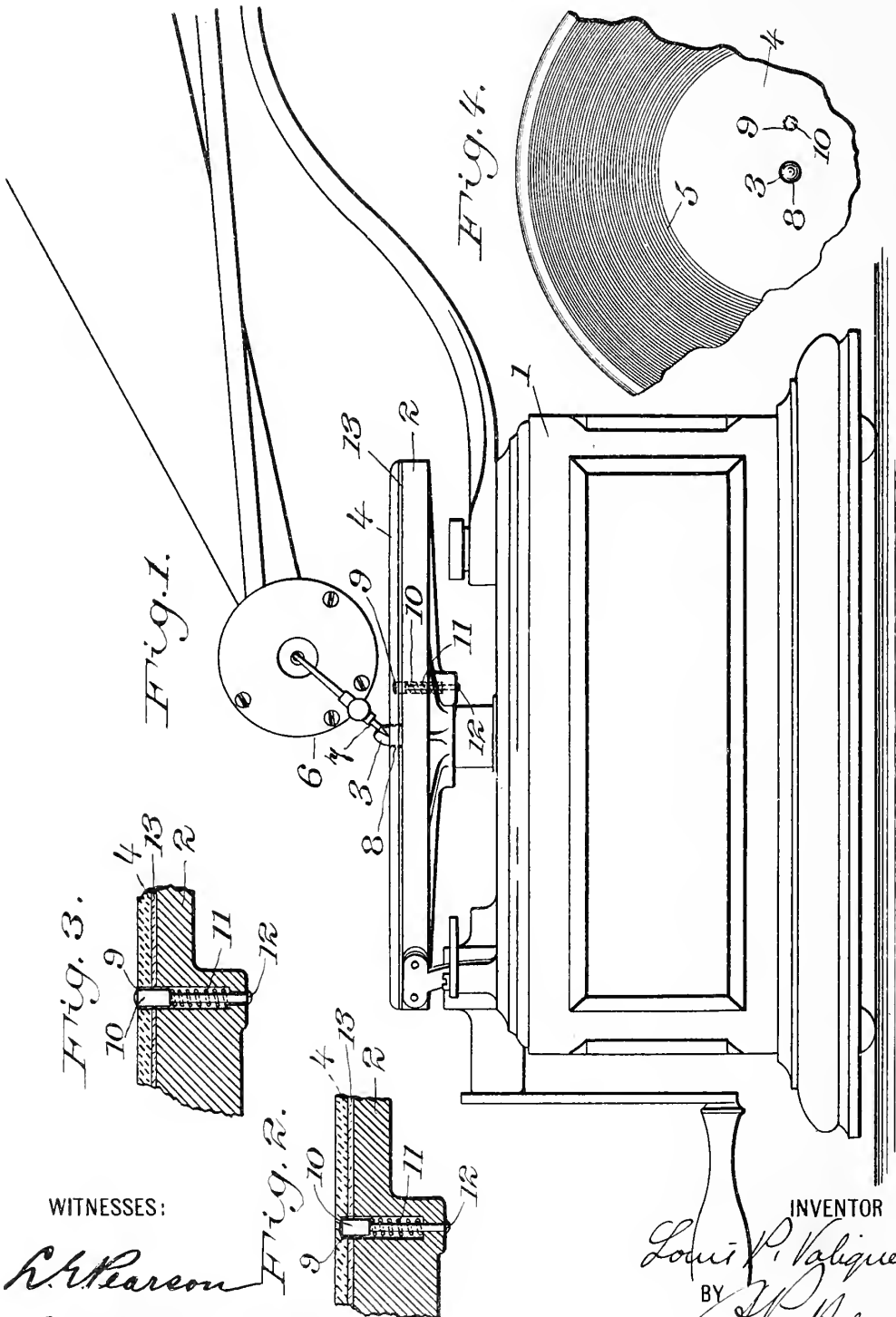


No. 780,246.

PATENTED JAN. 17, 1905.

L. P. VALIQUET.
TURN TABLE FOR TALKING MACHINES.

APPLICATION FILED MAR. 27, 1902.



WITNESSES:

R. Pearson
W. H. Humphrey.

INVENTOR

Louis P. Valiquet
BY *W. H. Humphrey*
ATTORNEY

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y.

TURN-TABLE FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 780,246, dated January 17, 1905.

Application filed March 27, 1902. Serial No. 100,206.

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of the city of New York, county of New York, State of New York, have invented certain new and useful Improvements in Turn-Tables for Talking-Machines, of which the following is a specification.

My invention relates to talking-machines, and is especially applicable to the class of talking-machines in which disk-shaped flat sound-records are employed. The sound-record groove in such case usually exists in the form of a spiral line sunk into one face of the disk. The reproducing-machine has a horizontal table rotating on a vertical axis and means, such as a spring-motor, for rotating said table. On this table is placed the sound-record. A reproducing-stylus, maintained in position above the record, rests in the sound-groove therein. It is necessary, of course, that the sound-record shall rotate with the table, so as to cause the inequalities in the sound-record groove to vibrate the stylus. In the first machines of this type put upon the market it was customary to secure this result by clamping the record to the table by means of a thumb-nut which screwed down on a central stud, projecting upward from the center of the table through an opening in the center of the record-disk. A disadvantage of this construction is the time consumed in unscrewing and screwing down again the thumb-nut every time a record is changed and the general awkwardness of the manipulation required. In my application Serial No. 699,429, filed December 16, 1898, I have shown an improved means for compelling the record to revolve with the table, which consists of a pin projecting upward from the table and at a short distance from the center thereof into a second opening in the record-disk. This pin being rigid and unyielding, however, prevents the record disk or tablet from lying flat on the table until the tablet has been turned, so that the recess comes opposite to the pin. This requires a certain amount of time and effort on the part of the user, and it is to obviate this that my present improvement is designed.

The preferred form of my invention is embodied

in an apparatus shown in the accompanying sheet of drawings, in which—

Figure 1 is a side elevation of a talking-machine with my invention applied thereto. Figure 2 is a detail sectional view thereof. Figure 3 is a similar section showing a modification. Figure 4 is a plan view of a segment of a sound-record made in conformity with my invention.

Throughout the drawings like reference-figures indicate like parts.

The casing 1 of the machine contains a spring-motor of any convenient form adapted to rotate the table 2. The pointed pin 3 projects upwardly from the center of the table and is concentric with the axis thereof. The disk or tablet 4 has the spiral sound-record groove 5 formed in its upper face (see Fig. 4) in the usual manner. The reproducer 6 is maintained in position over the record with its stylus 7 in engagement with the groove 5, all in the usual way. The record-disk has a central opening 8, with which the pin 3 engages to center the record on the table, and also has a recess 9 eccentric to the disk, but inside of the sound-record grooves 5, with which the spring-pin 10, set in a recess bored in the table 2, engages. This recess 9 may extend through the disk 4, as shown in Fig. 3; but preferably it only extends part way through the thickness of the disk, as shown in the remaining figures of drawings, thereby forming a socket in the under side of the record-tablet. The pin 10 is forced up into engagement with the recess 9 by a spring 11 or by any other apparatus producing a yielding pressure. The lower end of the pin 10 or of an extension from it has its head upset, as at 12, or some other equivalent device is employed to limit the upward motion of the pin and prevent the spring from forcing it entirely out of its socket.

The table 2 usually has the covering 13, of cloth or other sound-dampening material, having a rough surface, which under ordinary conditions presents sufficient frictional resistance to prevent the record-tablet from sliding on its surface. The pin 10 passes through a suitable opening in said covering 13.

The mode of operating my invention is the following: The reproducer 6 being swung to

one side the sound-record disk may be instantly removed and a different one put in place by slipping it over the central pin 3, the tapering point of which readily enters the hole 8. If the recess 9 drops down over the spring-pin 10, the disk is at once locked to the table and ready for reproduction. In nearly every case the recess 9 and pin 10 do not register at first. The weight of the disk is then sufficient, however, to compress spring 11, so that the record-disk comes to a bearing on the table. The stylus is then placed in the sound-groove and the machine started into action. In many cases the friction of the material is sufficient to cause the record-tablet to rotate with the table 2. If the disk slips on the cloth 13, the pin 10 soon swings around under the recess 9, the spring 11 forces the pin up into engagement with the recess, and the record then becomes locked to the table, and the reproduction of sound proceeds. A further advantage of this use of the spring-pin resides in the fact that when a recess is provided in a talking-machine record which does not extend entirely through the record-disk these recesses are liable to be of different depths, and when the record is placed upon the turn-table the pin will adjust itself to the varying depths of the recesses and obviate the objection that if the depth of the recess should be shallower than the length of the projecting end of the pin the table would rock upon the pin and so cause the record to operate unevenly and cause the sounds to be produced by the sound-box to be irregular and unsatisfactory. Of course it is obvious that the strength of the spring which forces the pin upward should be less than the downward force exerted by the weight of a sound-record.

The advantages of my invention comprise simplicity, convenience in manipulation, economy in first cost, and saving of time to the operator, combined with certainty of action, the pin 10 engaging the sound-record disk in a manner that absolutely prevents slipping unless the parts are broken.

It is evident, of course, that various changes could be made in the details of construction illustrated without departing from the spirit and scope of my invention. Other forms of spring might be used. Different means for mounting the pin 10 in the table might be employed and other changes made while still employing the principle of my invention.

Having, therefore, described my invention,

what I claim as new, and desire to protect by Letters Patent, is—

1. In a turn-table for talking-machines, the combination of a fixed pin, a vertically-movable eccentric-pin carried by the turn-table, and a spring forcing said movable pin upward so that the latter projects a short distance above the surface of the table, and with a force slightly less than that of the weight of a record carried by said table.

2. In a turn-table for talking-machines, the combination of a fixed pin carried by said table, a vertically-movable eccentric-pin carried by said table, and a coiled spring surrounding said movable pin and adapted to force the latter upward with a force less than the weight of a record, and normally projecting above the turn-table so as to engage a sound-record carried thereon.

3. In a turn-table for talking-machines, the combination with a centering-pin for the sound-record, an eccentric vertically-movable pin carried by a recess in said turn-table, and a spring normally forcing said pin upward with a force slightly less than the weight of a sound-record so that a portion of said pin normally projects above the surface of the table for engagement with a sound-record.

4. In a turn-table for talking-machines, the combination of a fixed pin for locating a sound-record upon said turn-table, a vertically-movable pin carried by said table, means for forcing said pin upward with the yielding pressure slightly less than the force due to the weight of a sound-record, and means for limiting the upward movement of said pin so that a certain portion of the length of the pin normally projects above the surface of the table to engage with a sound-record carried thereon.

5. In a talking-machine, the combination of a turn-table therefor, a fixed pin carried by said turn-table, a vertically-movable pin eccentric to said first-named pin, means for forcing said vertically-movable pin upward with a yielding pressure slightly less than the weight of a sound-record, and a sound-record carried by said turn-table having recesses therein adapted to engage said fixed pin and said movable pin respectively.

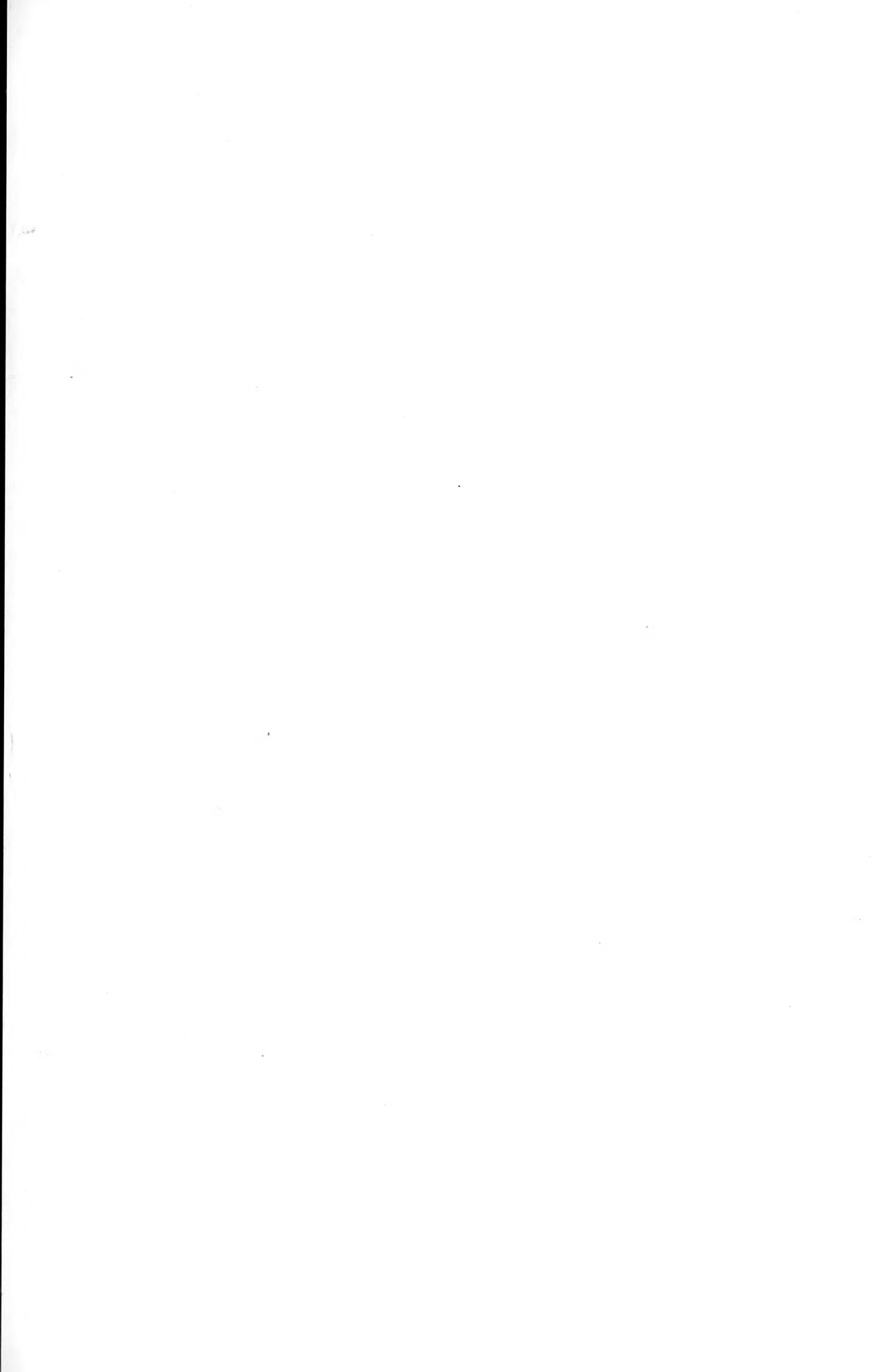
Signed at New York city, New York, this 26th day of March, 1902.

LOUIS P. VALIQUET.

Witnesses:

W. H. PUMPUREY,

L. E. PEARSON.



A. KELLER.
SOUND BOX.

APPLICATION FILED JUNE 25, 1904.

Fig. 1.

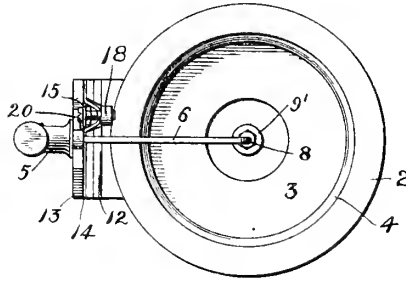


Fig. 2.

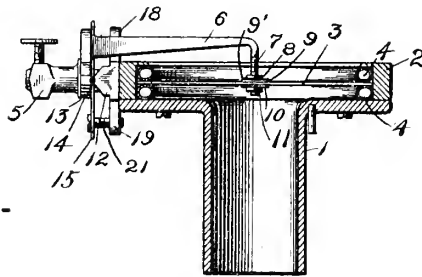


Fig. 4.

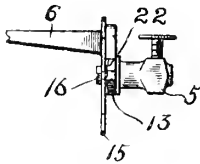


Fig. 5.

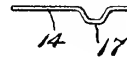
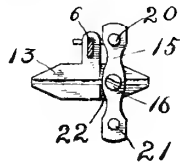


Fig. 3.



Witnesses
Chas. B. Rand
[Signature]

Inventor
Alfred Keller
By his Attorneys
Barrett, Sumner & McCord

UNITED STATES PATENT OFFICE.

ALFRED KELLER, OF ST. CROIX, SWITZERLAND, ASSIGNOR TO LOUIS PHILIPPE MERMOD, GUSTAVE ALFRED MERMOD, AND LEON MARCEL MERMOD, COPARTNERS TRADING UNDER THE NAME OF MERMOD FRÈRES, OF ST. CROIX, SWITZERLAND.

SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 780,506, dated January 24, 1905.

Application filed June 25, 1904. Serial No. 214,095.

To all whom it may concern:

Be it known that I, ALFRED KELLER, a citizen of Germany, residing at St. Croix, Canton of Vaud, Switzerland, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a full, clear, and exact description.

My invention relates to improvements in sound recording and reproducing devices, and particularly to what is generally termed a "sound-box."

The object of the invention is to provide a new and improved means for mounting the transmitting-arm.

The invention consists in an instrument embodying the principles illustrated in the accompanying single sheet of drawings.

Figure 1 is a plan view of those portions of an instrument which are necessary to illustrate the improvements of my invention. Fig. 2 is a side elevation of the same, but showing the casing in section. Fig. 3 is a detail view showing the construction of the support for the transmitting member. Fig. 4 is a detail side elevation of a portion of the transmitting member. Fig. 5 is a detail view showing the pivot for transmitting member.

1 is the main body of the casing. 2 is an annular ring secured thereto.

3 is a diaphragm formed of suitable material—for instance, mica.

4 4 are small rubber tubes constituting yielding means for supporting the diaphragm around its circumference.

5 is the main body of the transmitting member, which is adapted to carry a stylus of suitable construction.

6 is the arm of the transmitting member.

7 is a post integral with the arm, which extends in the direction of the axis of the casing. This is provided with screw-threads.

8 is a nut on the post 7.

9 and 10 are washers, one on each side of the diaphragm, and 11 is a locking-nut on the inside of the casing. By this means the transmitting member may be securely fastened to the diaphragm and may be adjusted by means

of the nuts 8 and 11 to obtain any degree of tension on the diaphragm or any position of the arm which may be desired. These washers are formed of thin but very tough paper, which afford a sufficiently yielding seat for the nuts, but which efficiently support the diaphragm and close the opening through which the post 7 extends. The upper washer 9 is preferably reinforced on its upper side by a very thin metal washer 9', which protects the paper washer. The lower washer, however, being situated inside the casing, does not require this reinforcement.

12 is a block formed as a part of the casing and having its edge grooved at right angles to the transmitting-arm 6.

13 is a block corresponding to 12, but formed as a part of the transmitting device. The face adjacent the block 12 is grooved.

14 is a wire forming a roller-bearing, which rests in the grooves in the adjacent faces of the blocks 12 and 13. This supports a pivotal support for the transmitting device which is practically frictionless and which confines the movement of the transmitting-arm to a direction at right angles to the diaphragm.

15 is a double-arm spring, which is secured to the transmitting device by means of a screw 16. The wire bearing 14 affords a bearing at both sides of the spring 15, and for this purpose I have formed the wire particularly as shown in Fig. 5.

17 indicates an offset bend to allow for the position of the spring 15 and screw 16.

18 and 19 are two lugs carried by the casing and integral with the block 12.

20 and 21 are screws which pass through the spring 15 and take into tapped holes in the lugs 18 and 19. By means of these screws the transmitting device is secured to the casing. The tension on the diaphragm 3 up or down may be varied by adjusting the screws 20 and 21. The spring 15 affords a yielding support, which distributes the strain on the transmitting device evenly, so as to permit the diaphragm to vibrate up and down. To increase the sensitiveness, I have cut away or

beveled off the edges of the bearing-block 13 of the transmitting member immediately each side of the support for the spring 15. This is shown particularly in Figs. 3 and 4. 22 5 indicates the cut-away portion. Vibrations are transmitted to and from the diaphragm without alteration.

While these improvements in the method of mounting the transmitting member are in 10 the direction of simplicity, their advantages will be well understood by those skilled in the art. The diaphragm may be removed and replaced by any one, while the arm may be adjusted as desired.

15 What I claim is—

1. In a sound-box, the combination of a casing having a long grooved bearing-block, a transmitting member having a corresponding long grooved bearing-block and a continuous 20 wire bearing for pivotally supporting said transmitting member along said bearings.

2. In a sound-box, the combination of a casing, a bearing carried thereby, a transmitting member having a corresponding bearing, a 25 spring carried by said transmitting member and extending above and below said bearings, lugs carried by said casing and adjusting-screws coacting between the ends of said

spring and said lugs one on each side of the bearings. 30

3. In a sound-box, the combination of a casing, a transmitting member, a spring attached thereto, adjusting-screws coacting with the ends of said spring, and a wire forming a long bearing for said member on each side of said 35 spring.

4. In a sound-box, the combination of a casing, a transmitting member, a spring, a screw for attaching said spring to said member, a wire forming bearings for said member said 40 wire being bent to offset the head of said screw, and means for attaching said spring to said casing.

5. In a sound-box, the combination of a casing, a diaphragm, a transmitting member, and 45 a long roller-bearing for supporting said member on said casing, and means for holding said transmitting member in position independently of said bearing.

Signed at Geneva, Switzerland, this 9th day 50 of June, 1904.

ALFRED KELLER.

Witnesses:

HORACE LEE WASHINGTON,
L. H. MUNIER.



T. EMERY, JR. & W. H. ADKINS.
MEGAPHONE.

APPLICATION FILED AUG. 10, 1904.

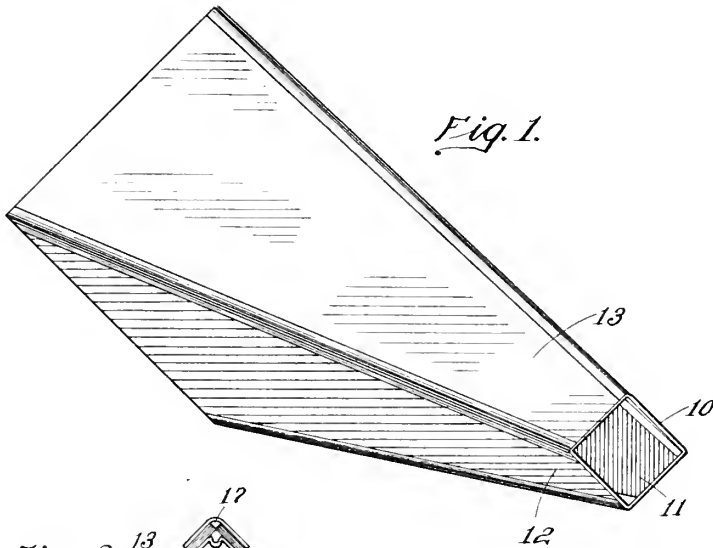


Fig. 1.

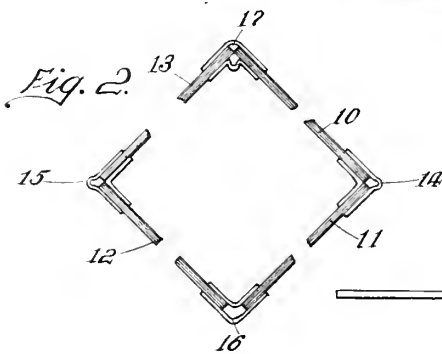


Fig. 2.

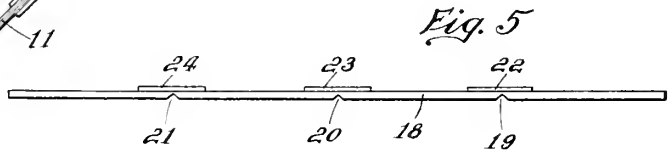


Fig. 5.

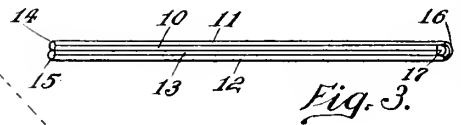


Fig. 3.

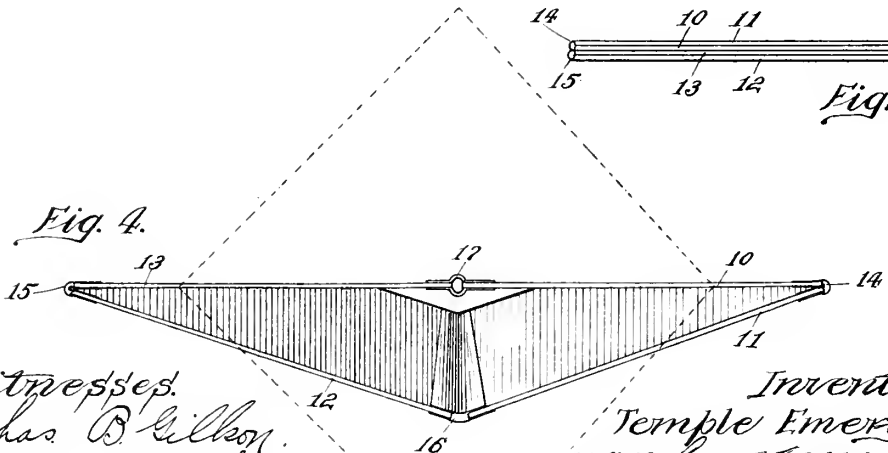


Fig. 4.

Witnesses:
Chas. B. Kilson
E. M. Klatchen

Inventors:
Temple Emery Jr.
William H. Adkins.
By Louis T. Johnson
Attly.

UNITED STATES PATENT OFFICE.

TEMPLE EMERY, JR., AND WILLIAM H. ADKINS, OF ST. LOUIS, MISSOURI,
ASSIGNORS TO MIDDLEBY OVEN MANUFACTURING CO., A CORPORATION
OF ILLINOIS.

MEGAPHONE.

SPECIFICATION forming part of Letters Patent No. 781,137, dated January 31, 1905.

Application filed August 10, 1904. Serial No. 220,252.

To all whom it may concern:

Be it known that we, TEMPLE EMERY, JR., and WILLIAM H. ADKINS, citizens of the United States, and residents of St. Louis, State of Missouri, have invented certain new and useful Improvements in Megaphones, of which the following is a specification and which are illustrated in the accompanying drawings, forming a part thereof.

The object of this invention is to provide a collapsible megaphone which when not in use may be folded to so small a compass that it may be carried in the user's pocket.

To this end the invention consists in a megaphone having its side walls composed of inter-folding panels, so that the instrument will collapse or fold to a flat form.

In the accompanying drawings, forming a part of the specification, Figure 1 is a perspective view of the megaphone. Fig. 2 is a detail end view of the same when open. Fig. 3 is an end view of the same when closed. Fig. 4 is an end view showing the megaphone partially closed, its open form being indicated in dotted lines; and Fig. 5 is an end view of a blank which may be used in forming the instrument and showing a modified form of construction.

In the preferred form of construction the megaphone has a plurality of sides, preferably four, as shown, its shape being that of a truncated pyramid and each of its sides being a trapezoid. When the sides, as 10, 11, 12, and 13, are made of separate pieces, they are preferably rigid and may be composed of strawboard, tarboard, celluloid, or any other suitable material. Such sides are united by any suitable form of hinge, preferably strips of binders' cloth cemented to both the outside and inside of the joint.

Referring to Figs. 2, 3, and 4, it will be seen that the instrument is folded by pressing in one of the joints, as 17, until it passes the central position and folds in the opposite direction. To accomplish this movement, the opposite joint, as 16, is necessarily pressed inwardly until the joint 17 reaches and passes beyond the position shown in solid lines in Fig. 4. When the instrument is closed, two of the sides, as 10 and 13, are folded in be-

tween the sides 11 and 12, and in order that when so folded the instrument may be compact the two inner sides are preferably of slightly less width than the two outer sides. The joints should be made with reference to ease of flexure in the desired direction only. Inasmuch as the joints 14 and 15 are never opened beyond approximately a right angle, the inner joint-strip may be shorter than the outer one, and the latter should be of sufficient length to permit the adjacent sides to come into contact without strain upon the joint. Inasmuch as the joint 16 is flexed, so as to spread the sides 11 and 12 beyond the right angle, as shown in Fig. 4, it is preferably looser or more open than the other joints, and this also provides for the spreading of the two sides somewhat in order to receive the sides 10 and 13 when the instrument is closed. As the joint 17 must be flexed in both directions, it should also be somewhat loose or open.

A cheap form of construction may be provided by not making each of the sides as a separate piece.

In Fig. 5 is shown a blank adapted to be so constructed as to constitute all of the sides of a four-side megaphone. Preferably such blank is scored, as shown at 19, 20, and 21, so that it will more readily bend to form the joints, as 14, 16, and 15, respectively, and it is desirable also to reinforce the joints by lining them with a strip of fabric, as indicated at 22, 23, and 24. The extreme edges of the blank are brought together to constitute the joint corresponding with the joint 17 of Fig. 2, and such edges may be permanently secured and hinged together in the same manner as is indicated at 17.

When the instrument is open for use, it is preferably grasped so as to bring inward pressure upon the joints 14 and 15, and as these joints are so made that they readily flex to fold together the sides united by them and do not tend to readily flex in the opposite direction beyond the position indicated in Fig. 2 such pressure will hold the instrument in its open form ready for use. It is also obvious that such an instrument may be changed in

cross-sectional form when in use—as, for example, it may be used when in the form indicated in solid lines in Fig. 1 and when so used will tend to condense the sound vertically.

5 We claim as our invention—

1. As an article of manufacture, a megaphone having its walls composed of permanently-joined interfolding panels.

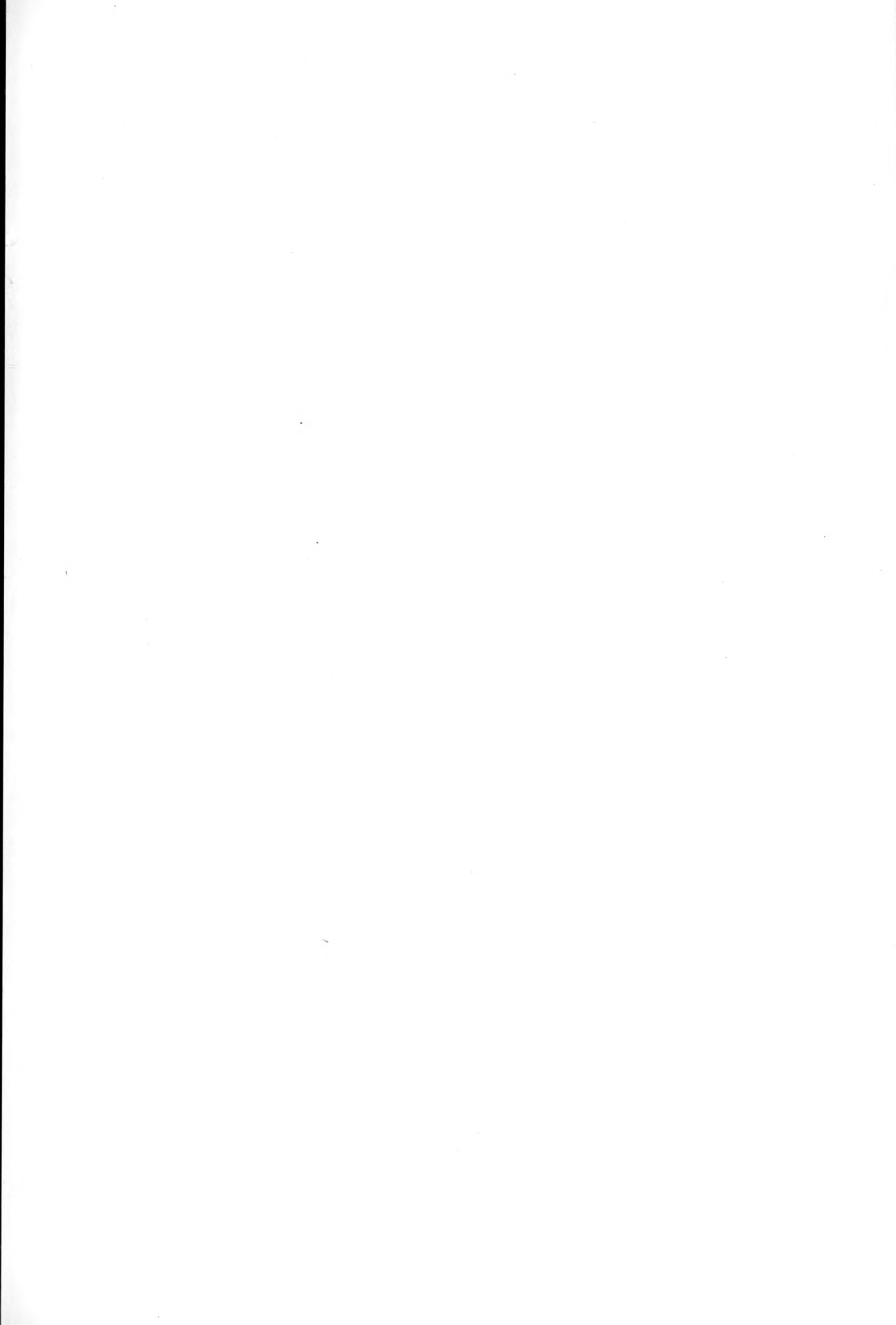
10 2. As an article of manufacture, a megaphone having its walls composed of at least four panels hinged together, the hinge uniting one pair of panels flexing in both directions.

3. As an article of manufacture, a megaphone having its walls composed of four trapezoidal panels hinged together, one pair of oppositely-disposed hinges flexing to fold the sides together only, and one of the hinges intermediate of said pair flexing in both directions. 15

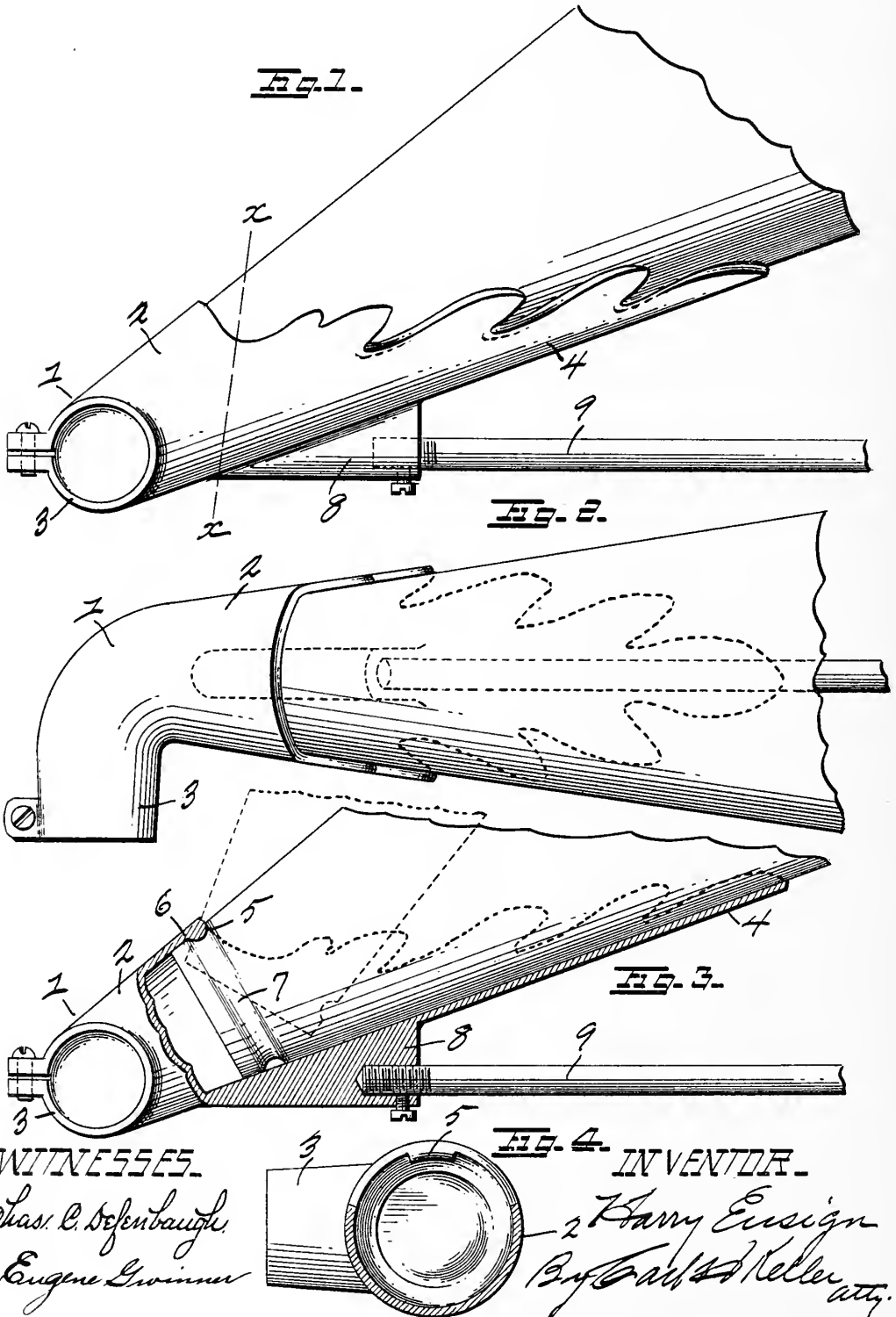
TEMPLE EMERY, JR.
WILLIAM H. ADKINS.

Witnesses:

ARTHUR H. HAMILTON,
EDWARD BERG, JR.



H. ENSIGN.
MEANS FOR DETACHABLY MOUNTING TALKING MACHINE HORNS.
APPLICATION FILED JULY 1, 1904.



WITNESSES.

Chas. C. Deffenbaugh
Eugene L. Winner

FIG. 4. INVENTOR.

Harry Ensign
By Paul H. Keller atty.

UNITED STATES PATENT OFFICE.

HARRY ENSIGN, OF TOLEDO, OHIO, ASSIGNOR TO THE TALK-O-PHONE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

MEANS FOR DETACHABLY MOUNTING TALKING-MACHINE HORNS.

SPECIFICATION forming part of Letters Patent No 781,195, dated January 31, 1905.

Application filed July 1, 1904. Serial No. 214,877.

To all whom it may concern:

Be it known that I, HARRY ENSIGN, of Toledo, county of Lucas, and State of Ohio, have invented certain new and useful Improvements
5 in Means for Detachably Mounting Talking-Machine Horns; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make
10 and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form part of this specification.

My invention has reference to an improved
15 construction for detachably mounting talking-machine horns; and it has for its object to provide simple, inexpensive, and effective means for connecting a talking-machine horn with its elbow to permit the instant attachment
20 or detachment of the same.

In carrying out my invention I employ the novel combination and arrangement of the parts hereinafter shown, described, and
25 claimed.

In the drawings, Figure 1 is a side elevation showing a talking-machine horn supported
30 by an elbow embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is a sectional elevation, the forward portion of the elbow being in section to disclose the locking engagement of the parts when the horn is in
35 position in the elbow. Fig. 4 is a front view of the elbow, the section therethrough being on line *x-x*, Fig. 1.

Referring to the details of construction, 1
40 indicates a hollow elbow having the conical body 2, adapted to form a socket to receive the small end of the horn and having the lateral extension 3 for the attachment of a sound-box, although the extension is not essential,
45 since the elbow may serve as a support for the horn without the sound-box being attached directly thereto, as in the construction of rigid-arm machines. The lower portion of the body 2 is extended forwardly at 4 to support the horn at a considerable distance from the small end. Arranged to project downwardly from the forward margin of the body 2 into the space inclosed by the socket adapted to

receive the small end of the horn is a lug or
50 projecting portion 5, adapted to engage a shoulder 6 upon the horn, an annular groove or depression 7 being made to extend entirely around the horn adjacent to its small end.
55 By providing the groove entirely around the horn the latter will be locked in any position in which it may be inserted into the socket within the body 2. It is, however, apparent that instead of providing an annular depression in the horn the latter may be provided
60 with a simple depression sufficiently large to receive the lug 5, or the metal of the horn may be punched out to provide a perforation to receive the lug, and thereby effect interlocking engagement. On the lower side of
65 the conical body 2 is provided a boss 8, adapted to receive the end of the pivotal arm 9, taking a position directly below the central axis of the horn, the usual tilting of the horn being by this means prevented. 70

In the operation of my invention upon introducing the horn into the socket of the elbow the same will be in the position indicated in dotted outline, Fig. 3, the lug 5 being in contact with the groove around the horn. The
75 horn is then swung about the lug 5 as a pivot until the parts are in the position indicated in Figs. 1, 2, and 3, the horn and elbow being firmly locked together. To detach the horn,
80 the forward end is raised, when the locking parts will be disengaged. It will be observed that when the horn is in position the same will be firmly supported by the forward extension of the elbow and that no additional supporting means will be required, the rubber-covered wire support usually employed to support the horns of talking-machines being dispensed with. 85

From the foregoing description it is clear that I provide a simple, inexpensive, and effective construction for detachably mounting
90 a talking-machine horn upon an elbow or other tubular support connecting with a sound-box.

Although in illustrating my invention I have disclosed a preferred embodiment thereof,
95 of, it is apparent that changes in detail may be made therein without constituting a substantial departure. For instance, interlock-

ing engagement of the horn with the elbow may be effected in various ways, as by providing a projection or lug upon the horn and a shouldered recess in the elbow adapted to be brought into interlocked engagement.

The novelty, utility, and advantages of my invention will appear to those skilled in the art to which my invention relates.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a means for detachably mounting talking-machine horns, a socket member having its upper forward portion cut away and its lower portion extended forwardly, and a horn supported by the extended portion of the socket and having interlocked connection with said socket, substantially as described.

2. In a means for detachably mounting talking-machine horns, a socket member having its upper forward portion cut away and having its lower portion extended forwardly, and a horn adapted to be inserted into the socket member and having interlocked connection therewith, said horn when in position in the socket member being adapted to rest upon said lower extended portion, substantially as described.

3. In a means for detachably mounting talking-machine horns, a socket member having a lower extended portion, a horn adapted to be inserted into the socket member to rest upon said extended portion, and interengaging parts upon the socket and the horn, substantially as described.

4. In a means for detachably mounting talking-machine horns, a socket member having an integral lower extended portion, a horn adapted to be inserted into the socket member and to rest upon said extended portion, and interengaging parts upon the socket and the horn, substantially as described.

5. In a means for detachably mounting talking-machine horns, a socket member having its upper forward portion cut away and having its lower portion extended forwardly, a horn adapted to be inserted into the socket member to rest upon the lower extended portion, and interengaging parts upon the horn and the socket disposed adjacent to the margin of the cut-away portion of the socket, substantially as described.

6. In a means for detachably mounting talking-machine horns, a socket member having

its upper forward portion cut away and having its lower portion extended forwardly, a horn adapted to be inserted into the socket member to rest upon the extended portion thereof, and interengaging parts between the horn and the socket member arranged to permit the detachment of the horn from the socket by lifting the forward end of the horn, substantially as described.

7. In a means for detachably mounting talking-machine horns, a socket member having its upper forward portion cut away and having its lower portion extended forwardly, a lug upon said socket member adjacent to the margin of the cut-away portion, and a horn adapted to be inserted into the socket member to rest upon the forward extension, said horn being provided with a shouldered recess to receive the lug upon the socket member, substantially as described.

8. In a means for detachably mounting talking-machine horns, a socket member having the lower portion thereof extended forwardly, a lug thereon adjacent to its upper forward margin, and a horn adapted to be inserted into said socket member to rest upon the forward extension, said horn being provided with an annular groove adjacent to its small end to receive the lug upon the socket member, substantially as described.

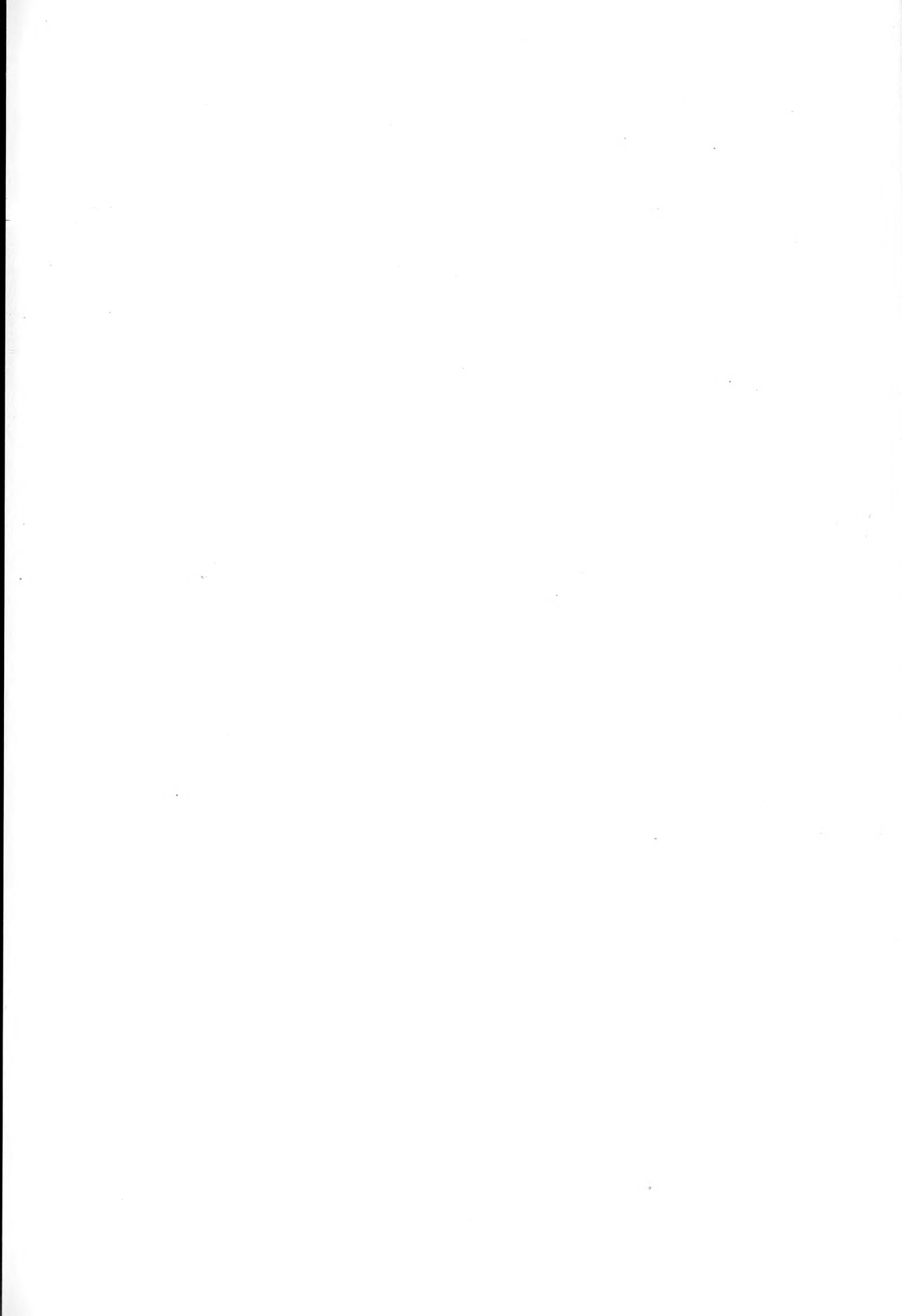
9. In a means for detachably mounting talking-machine horns, an elbow having a lateral extension for the attachment of a sound-box and having a hollow cone-shaped body forming a socket, said body having its upper forward portion cut away and having its lower portion extended forwardly, a lug projecting inwardly from the cone-shaped body adjacent to its forward margin, a supporting-arm rigidly secured to the lower side of the cone-shaped body below its central longitudinal axis, and a tapered horn adapted to be inserted into the cone-shaped body to rest upon the lower extended portion, said horn being provided adjacent to its small end with an annular groove to receive the lug upon the body of the elbow, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HARRY ENSIGN.

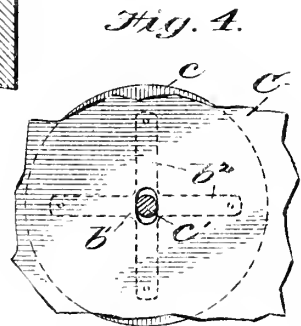
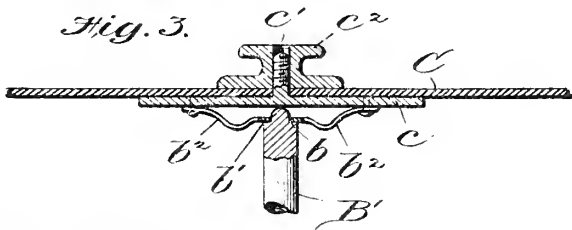
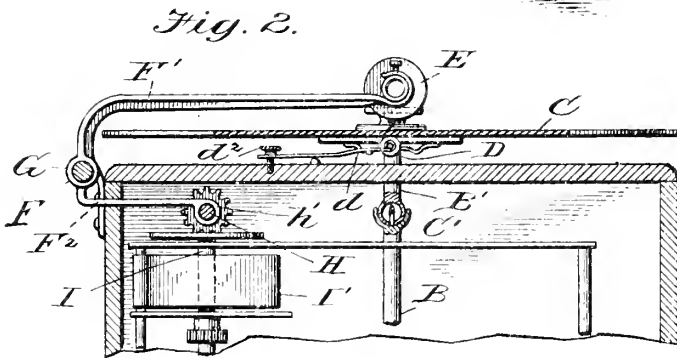
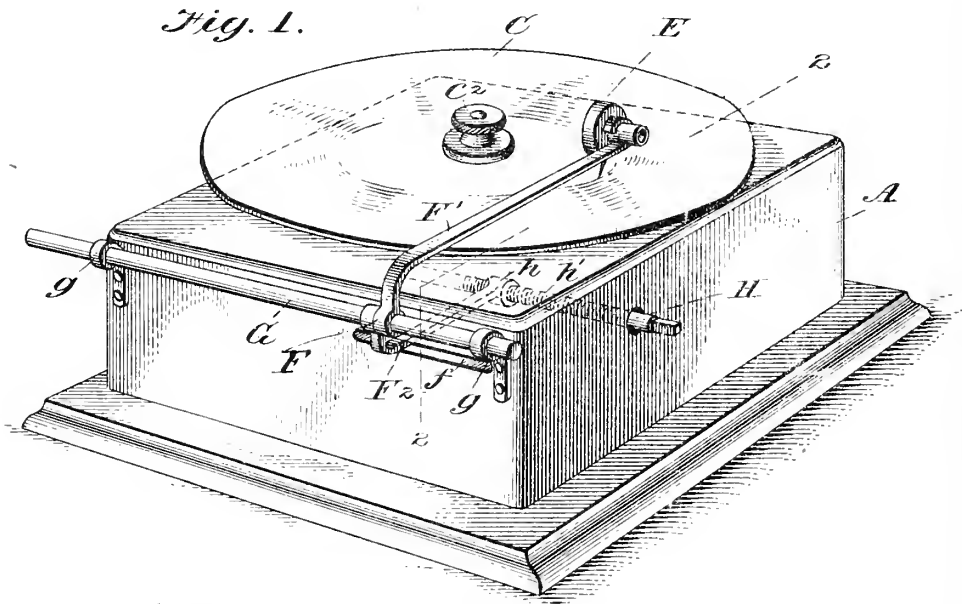
Witnesses:

CARL H. KELLER,
CHAS. C. DEFENBAUGH.



E. R. JOHNSON.
SOUND RECORDING AND REPRODUCING MACHINE.

APPLICATION FILED DEC. 22, 1898.



Witnesses.
J. A. Cross.
J. Henderson.

Inventor,
 Elbridge R. Johnson
 by *Thomas Peck.*
 his Attorney.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

SOUND RECORDING AND REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 781,429, dated January 31, 1905.

Application filed December 22, 1898. Serial No. 700,032.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound Recording and Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to certain improvements in sound recording and reproducing machines, and is particularly adapted to machines of the gramophone type wherein a flat circular record-disk is employed, but might be adapted to machines of other character.

The principal object of my invention is to provide means for supporting the record-disk in such a manner as to be capable of being tilted in any direction, also in providing means adapted to act on the under side of the disk for keeping the record-disk in constant contact with a rigidly-mounted reproducer, which disk is at the same time capable of a yielding movement, so as to accommodate itself to any irregularities or unevenness which might occur therein by reason of a slight warp or otherwise or such as might be due to imperfections in the mechanism which are apt to occur in all machines, especially those constructed at small cost.

A further object of my invention is to provide means for rigidly supporting the reproducing mechanism above the record-disk against movement toward or from the face of the record tablet or disk; by the terms "rigidly supported," as hereinafter employed, is meant rigidly supported against movement toward or from the record-tablet; the reproducer may of course be movable backward or forward; also in providing means for automatically carrying the said reproducer in a backward or forward direction, as may be required, to accommodate the record-groove to the stylus as the said record-disk is revolved.

In the class of sound recording and reproducing machines to which my invention relates, such as the gramophone, the sound

record or undulations are in the sides of the grooves, and the stylus is positively vibrated thereby. The object in keeping the disk in constant contact with the rigidly-mounted stylus is to keep it within the groove, and thus provide against any lost motion, which is always liable to occur even when great care is exercised in the construction of the machine, so shallow are the grooves. In records of this character, with their sound-undulations in the sides of the groove, it is not necessary that the base of the groove shall be in perfect contact with the stylus-point, as in records of the character of the gramophone and phonograph, where the sound-undulations are recorded in the base of the groove. All that is necessary in the gramophone-record is that the stylus-point shall not jump from the groove, but always remain therein. The aim of my invention is to provide means for keeping the groove about a rigidly-mounted stylus-point, and preferably but not necessarily against it, so as to reduce the liability of displacement, to a minimum, thereby presenting means providing against all lost motion incident to most machines of this character.

My invention allows of the production of machines at a minimum cost, and the same amount of care in the production and adjustment of the parts is not necessary, allowing the parts to be readily stamped by machinery and requiring less finishing, grinding, &c.

With these and other objects in view my invention consists in the construction such as is hereinafter fully described, and particularly pointed out in the claims.

Referring to the drawings, which form a part of this specification, and in which similar letters of reference are used to indicate similar parts, Figure 1 is a perspective view of a machine embodying my invention. Fig. 2 is a sectional elevation taken about on the line 2-2 of Fig. 1. Fig. 3 is a detail sectional elevation through the upper end of the main driving-shaft, illustrating the manner of securing the record-disk to the same. Fig. 4 is a plan view of the central portion of the record-disk, illustrating the elongated opening therein.

Fig. 5 is a detail illustrating in perspective the spring-supported idler.

In the drawings, A designates the outside casing, such as is commonly used in machines of this character, in which is located a spring-motor, which may be of any desirable construction. As the motor mechanism proper forms no important feature of my invention, I do not deem it necessary to illustrate or describe the same in detail.

B designates the main driving-shaft of the motor and is propelled by means of spring mechanisms as above referred to. In the upper part of this shaft B, I provide a universal joint C', which may be constructed in the manner illustrated in Fig. 2 of the drawings or which may be of any of the other well-known constructions, the object being to provide the upper end of this shaft with a universal movement. The construction of joint shown in the drawings consists, essentially, of socket portion provided upon the upper end of the shaft B, into which the ball portion on the lower end of the shaft B' is adjusted. To insure the rotary movement of the shaft B', a transversely-disposed pin is provided through the socket portion adapted to a slot provided substantially vertically in the ball portion, the pin and slot being so arranged as to allow the ball portion to freely rest in the base of the concavity of the socket portion. It is clear that the table C will therefore yield in operation in the desired manner. The upper section B' projects through an opening provided in the top of the casing A a short distance above the said casing. An annular shoulder b is provided on the upper end of section B', adapted to receive a spider b', constructed of thin resilient metal, the arms b² of which are bent or corrugated in substantially the shape illustrated in Fig. 3 of the drawings. Secured to the upper side of the spider b' is a flat disk or plate c, having in its center an upwardly-projecting screw-threaded boss c', this plate c being adapted to support and hold the record-disk C, the said record-disk being securely held thereon by means of the thumb-nut c², which is adapted to engage the screw-threaded boss c' and securely clamp the record-disk between it and the plate c. The joint C', provided on the shaft B, permits both sections of the said shaft to be revolved through the medium of its spring-motor, and at the same time allows the record-disk C, carried thereby, to be revolved, and also capable of being tilted in any direction. The resilient spider b', which supports the said record C, also allows the record-disk to be slightly tilted independent of the universal movement of the section B' of the driving-shaft, so that if the said record-disk should not be exactly true or should be slightly warped or not in a horizontal plane or the operative mechanism be not perfectly true the said resilient spiders will allow it to

yield slightly to accommodate such unevenness when it is in contact with the reproducing-stylus.

On the under side of the record-disk C, at a point directly below the position of the reproducing mechanism, is a spring-supported roller or idler D, carried on the free end of a flat metallic spring d, which bears in about its center on a block d', formed or secured on the top of the casing A, while the other end of said spring d is held to the casing A by means of a set-screw d² and by means of which the tension of the said spring may be regulated.

E designates the reproducing mechanism or sound-box of well-known construction, which is held in a position directly above the record-disk C rigidly against any vertical displacement or movement and against any lateral displacement save that given it by the positive movement of the rotating screw h in the travel of the stylus and sound-box across the record-disk, so that the stylus-point may rest in the grooves of the said record, the spring-pressed idler heretofore described serving to constantly hold the said record-disk so that the groove will remain about the stylus-point and prevent displacement. The sound-box E is supported by means of an arm F', formed on a bracket F, which is rigidly supported on a shaft G, journaled by means of the brackets g to one side of the casing of the machine. This shaft G is loosely journaled in the said bracket g, so as to be capable of a sliding longitudinal movement, which is imparted to it automatically and simultaneously with the revolving of the record-disk, so as to allow the stylus-point of the reproducing mechanism to feed inwardly or outwardly in order to follow the grooves of the record-disk as the said disk revolves.

H designates the winding-shaft, which is generally horizontally arranged, as illustrated in the drawings, having one end projecting outside of the casing A and squared for the reception of a key, while its other end is suitably geared to the shaft I, which carries the propelling-spring I' of the motor. The shaft H is provided with coarse screw-threads h', extending almost its entire length, adapted to engage an interiorly-threaded sleeve h, carried on the free end of the arm F² of the bracket F, which is rigidly secured on the shaft G, as heretofore described. This arm F² passes through a slot f, provided in the side of the casing A, as clearly illustrated in Fig. 1 of the drawings. Thus as the shaft H is revolved to wind up the spring of the motor the bracket F is fed outwardly by means of its arm F² and sleeve h engaging the threads h' on the said shaft H, carrying with it the shaft G, which slides loosely in the bracket g heretofore described, also carrying the reproducing mechanism E to the point near the periphery of the record, the operator during

the winding operation pressing down and tilting that side of the record under the stylus-point, so as to prevent the said point from scratching or mutilating the said record.

5 After the spring is sufficiently wound the motor when released by suitable brake mechanism commences to operate and the driving-shaft B and B', carrying the record-disk C, is thereby revolved, while the shaft H revolves
10 in an opposite direction to that of winding and feeds the bracket F and the reproducing mechanism E toward the center of the disk in the proper proportion to allow the stylus-point to follow in the record-grooves, the
15 spring-pressed idler, which bears against the under side of the record, serving to keep the said record-disk constantly in contact or in engagement at all times with the stylus-point of the reproducing mechanism.

20 I do not limit myself to the particular mechanism described and illustrated for providing a yieldingly-supported record, nor to the mechanism for feeding the producer, so as to follow the grooves which may be fed automatically by the record-grooves as the record
25 is revolved, as various changes in construction may be employed without departing from the spirit and scope of my invention.

Having thus described my invention, what
30 I claim, and desire to secure by Letters Patent, is—

1. In a sound recording and reproducing machine, a rigidly-mounted reproducer, a yieldingly-mounted tilting record, and means for
35 keeping the grooves of the record in contact with the stylus of the reproducing mechanism, for the purpose stated.

2. In a sound recording and reproducing machine, a yieldingly-mounted revoluble record-holder, a laterally-movable reproducer located above the same rigidly mounted against
40 movement toward and from the face of the record and means for keeping the grooves of the record in contact with the stylus of the reproducing mechanism and for disengaging the same.

3. In a talking-machine the combination of the reproducing-stylus movable in a horizontal plane, the tilting sound-record rotating on
50 a vertical axis, and mechanism for forcing the sound-record toward the reproducer with yielding pressure, substantially as described.

4. In a sound recording and reproducing machine, a tilting record, means for rotating the same, a sound-box provided with a diaphragm and stylus, and yielding supporting device for bringing the record-disk into engagement
55 with the stylus.

5. In a sound recording and reproducing machine, a rigidly-mounted reproducer, a yieldingly-mounted record-disk, means for keeping the walls of the grooves of the record-disk about the point of the stylus of the reproducing mechanism and means for positively
65 moving the reproducer to allow it to

follow the grooves of the record, substantially as described.

6. In a sound recording and reproducing machine, the combination of a revoluble record-disk mounted so as to yield in any direction, a rigidly-supported reproducer arranged above
70 said record, and mechanism adapted to act on the under side of the record-disk for keeping the same in constant but yielding contact with reproducing mechanism, substantially as described.
75

7. In a sound recording and reproducing machine in combination with the motor mechanism, a rigidly-mounted reproducing mechanism on a laterally-moving carrier, a yielding
80 record-tablet mounted on a universal joint to conform itself to the stylus of the rigidly-mounted reproducing mechanism, substantially as described.

8. In a sound recording and reproducing machine, in combination with the motor mechanism a rigidly-mounted reproducer, a spring-supported record-tablet mounted on a universal joint adapted to keep the grooves of the
90 said record-tablet constantly about the stylus-point of the reproducer, substantially as described.

9. In a sound recording and reproducing machine, the combination with a driven shaft, a universal joint formed therein, a record-disk
95 carried by said shaft, a rigidly-mounted reproducer located above said record-disk, and means for keeping the record-disk in constant contact with the stylus of the reproducing mechanism, substantially as described.
100

10. In a sound recording and reproducing machine, the combination of a driven shaft, a universal joint formed in the upper part thereof, a yieldingly-mounted support carried on
105 the upper end of said shaft, a record-disk secured on said support, a rigidly-mounted reproducer located above the record-disk and means for keeping the grooves of the said disk in contact with the reproducing mechanism.

11. In a sound recording and reproducing machine, the combination of a yieldingly-mounted record-disk, a rigidly-mounted reproducer located above the same, and a spring-supported idler located under the said disk
115 for keeping the disk in constant contact with the reproducing mechanism, substantially as described.

12. In a sound recording and reproducing machine, the combination of a yieldingly-mounted record-disk, a rigidly-mounted
120 reproducer located above the same, an idler adapted to bear against the under side of the record-disk, a spring-support for said idler, and means for adjusting the tension of the said spring-support, substantially as described.
125

13. In a sound recording and reproducing machine, the combination of a driven shaft, a universal joint formed in the upper part thereof, a spider having spring-arms secured to the
130 upper end of said shaft, a supporting-plate

secured thereto, a record-disk carried by said supporting-plate, a reproducer rigidly mounted above the record-disk, and means for keeping the said disk in contact with the stylus-point of the reproducing mechanism, substantially as described.

14. The combination with the yieldingly-mounted record-disk, of a reproducer rigidly mounted above the same, means for keeping the record in contact with the reproducing mechanism and a rigid but laterally-movable support for the reproducing mechanism adapted to be operated on the unwinding and winding of the motor, substantially as described.

15. The combination with the winding-shaft of a spring-motor, of screw-threads provided thereon, a screw-threaded sleeve adapted to surround said shaft, a bracket-arm formed on said sleeve having its other end rigidly connected to a loosely-mounted horizontally-disposed shaft, an arm, F', rigidly secured on said shaft extending over the record-disk and a reproducer carried by the free end of said arm adapted to follow the grooves of the record-disk as the machine operates, substantially as described.

16. In a sound recording and reproducing machine, the combination of a yieldingly-mounted record-disk, a rigidly-mounted reproducer located above the said record-disk, means for holding the record-disk in constant contact with the stylus-point of the reproducer, a horizontally-disposed sliding shaft journaled in the side frame of the machine, a bracket-arm rigidly mounted on said shaft carrying the reproducer on its free end, and connections between the horizontally-disposed shaft and the winding-shaft of the motor whereby the reproducer is fed forward or backward simultaneously with the winding-shaft so as to allow the said reproducer to follow the grooves of the record, substantially as described.

17. In a sound recording and reproducing machine, the combination with the yieldingly-mounted record-disk, of a reproducer located above the same against the stylus of which the said disk is adapted to bear, a shaft, G, loosely mounted in brackets carried by the frame of the machine, an arm, F, rigidly secured to said shaft, G, having the reproducing mechanism rigidly supported on its free end, an arm, F', rigidly secured on the arm, G, having an interiorly-screw-threaded boss on its inner end, and a screw-threaded winding-shaft, H, suitably geared to the motor mechanism, said screw-threaded shaft being

adapted to the threaded boss of the arm, F', substantially as described and for the purpose stated.

18. In a sound-reproducing machine, a tilting record, a reproducer mounted rigidly in a direction normal to the record, and a support for the record mounted to yield in the same direction during reproduction.

19. In a talking-machine, the combination of a reproducing-stylus movable in one fixed plane only and a flexibly-mounted tilting sound-record of rigid material cooperating therewith.

20. In a talking-machine, the combination of a reproducing mechanism, and a tilting sound-record cooperating therewith.

21. In a talking-machine, the combination of a reproducing mechanism, and a flexibly-mounted tilting sound-record cooperating therewith.

22. In a talking-machine, the combination of a reproducing mechanism movable in one fixed plane only, and a tilting sound-record cooperating therewith.

23. In a talking-machine, the combination of a reproducing mechanism, a flexibly-mounted sound-record cooperating therewith, and means, independent of the sound-record, for moving said reproducing mechanism to allow the latter to follow the grooves of said sound-record.

24. In a talking-machine, the combination of a reproducing mechanism, a tilting sound-record cooperating therewith, and means, independent of the sound-record, for moving said reproducing mechanism to allow the latter to follow said grooves of said sound-record.

25. In a talking machine the combination of a reproducing mechanism movable in one fixed plane only, a flexibly-mounted sound-record cooperating therewith, and means, independent of the sound-record, for moving said reproducing mechanism to allow the latter to follow the grooves of said sound-record.

26. In a talking-machine, the combination of a reproducing mechanism, a tilting sound-record cooperating therewith, and a cushion supporting said sound-record, adjacent to and on the side thereof opposite the reproducing mechanism.

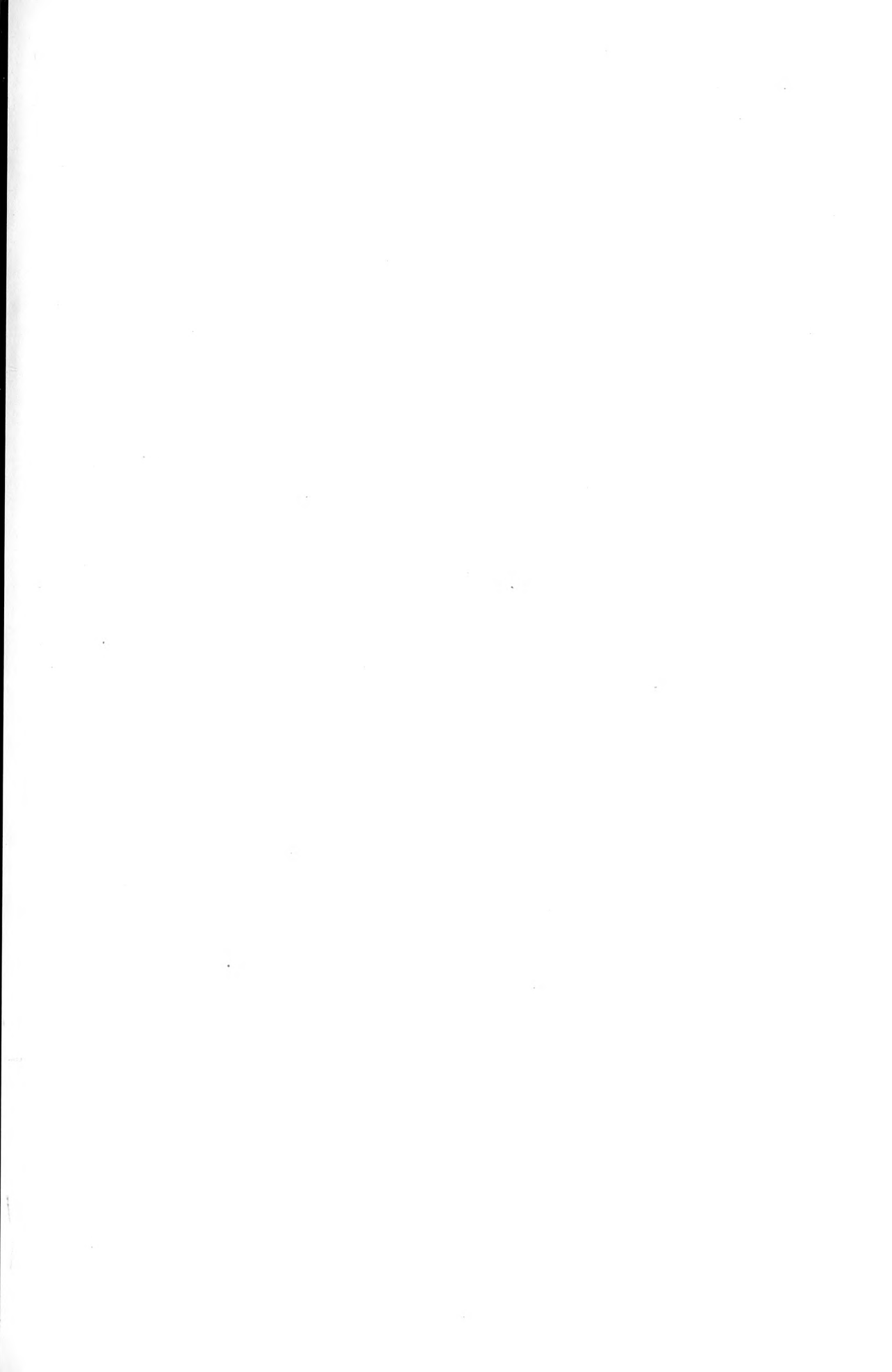
In witness whereof I have hereunto set my hand this 21st day of December, A. D 1898.

ELDRIDGE R. JOHNSON.

Witnesses:

BENJ. F. PERKINS,
HORACE PETTIT.

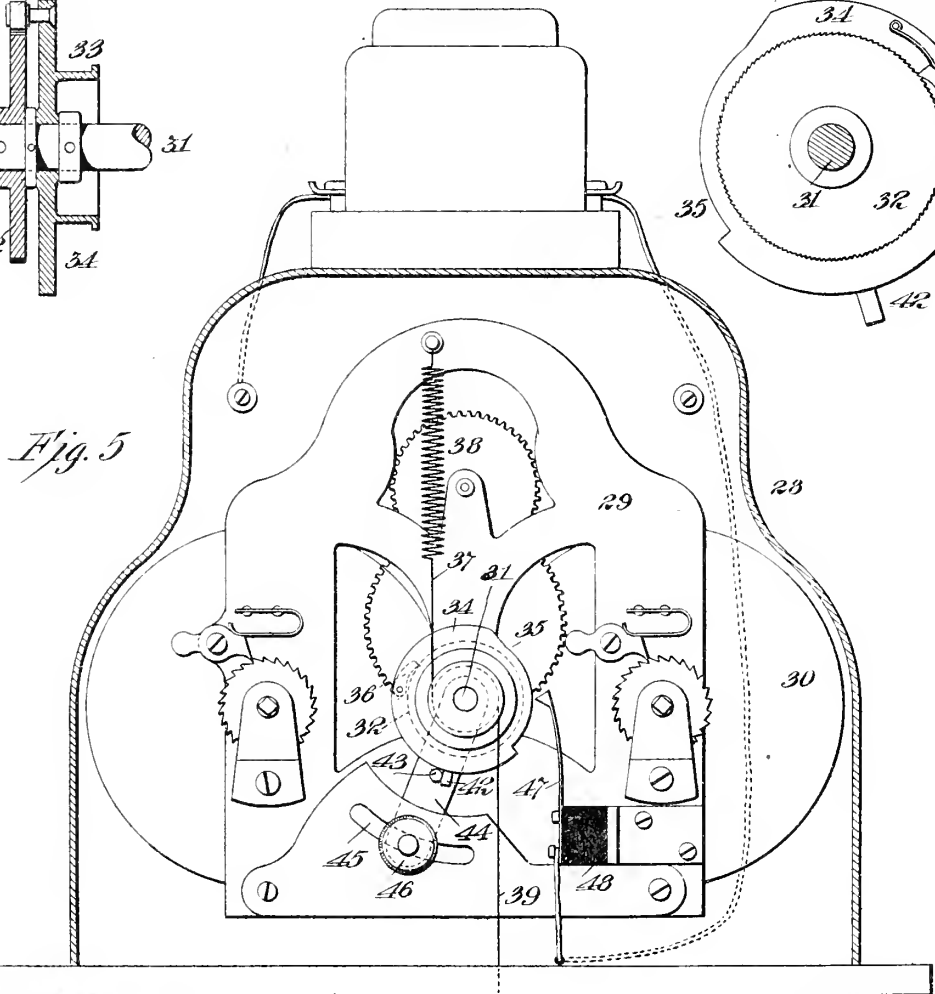
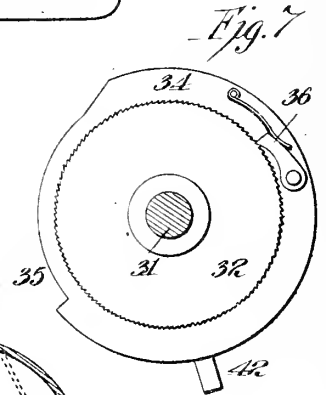
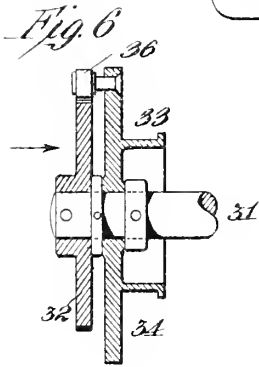
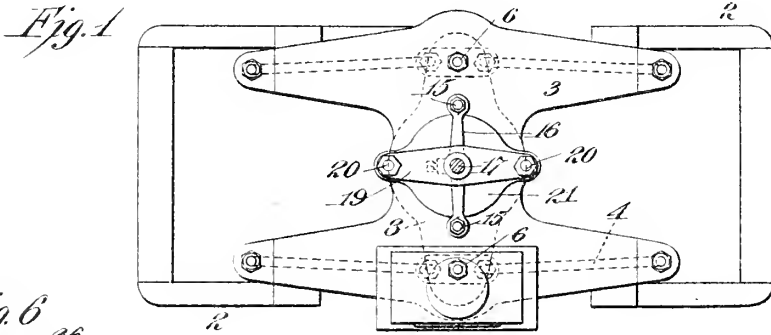
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W. H. MILLER & J. W. AYLSWORTH.
MACHINE FOR MAKING DIPPED PHONOGRAPH RECORDS OR BLANKS.

APPLICATION FILED MAR. 13, 1903.

3 SHEETS—SHEET 1.



Witnesses:

Jas. F. Coleman
 Geo. Robt Taylor

Inventor

Walter H. Miller
 Jonas W. Aylsworth
 by *[Signature]*
 Attorneys



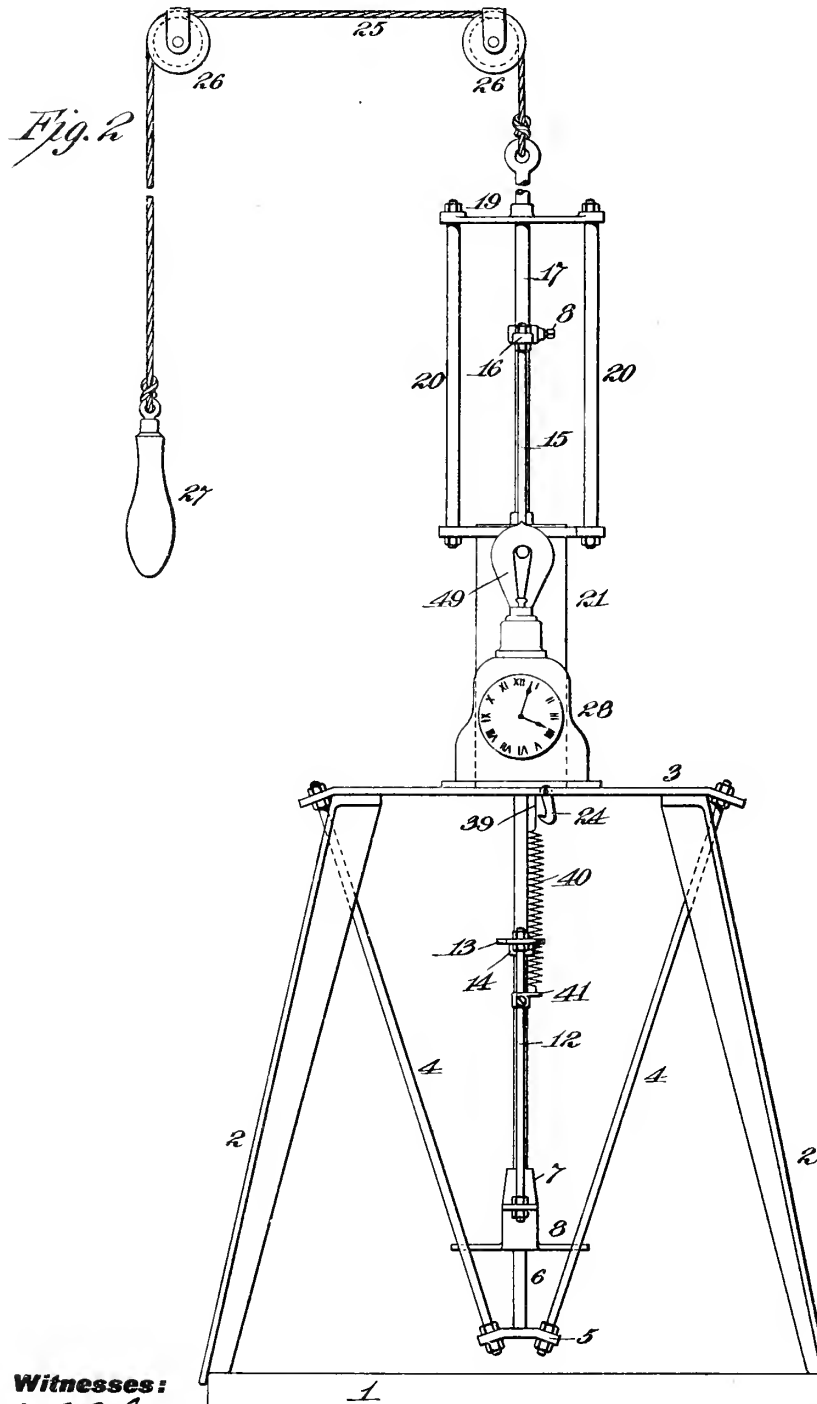
No. 781,893.

PATENTED FEB. 7, 1905.

W. H. MILLER & J. W. AYLSWORTH.
MACHINE FOR MAKING DIPPED PHONOGRAPH RECORDS OR BLANKS.

APPLICATION FILED MAR. 13, 1903.

3 SHEETS—SHEET 2.

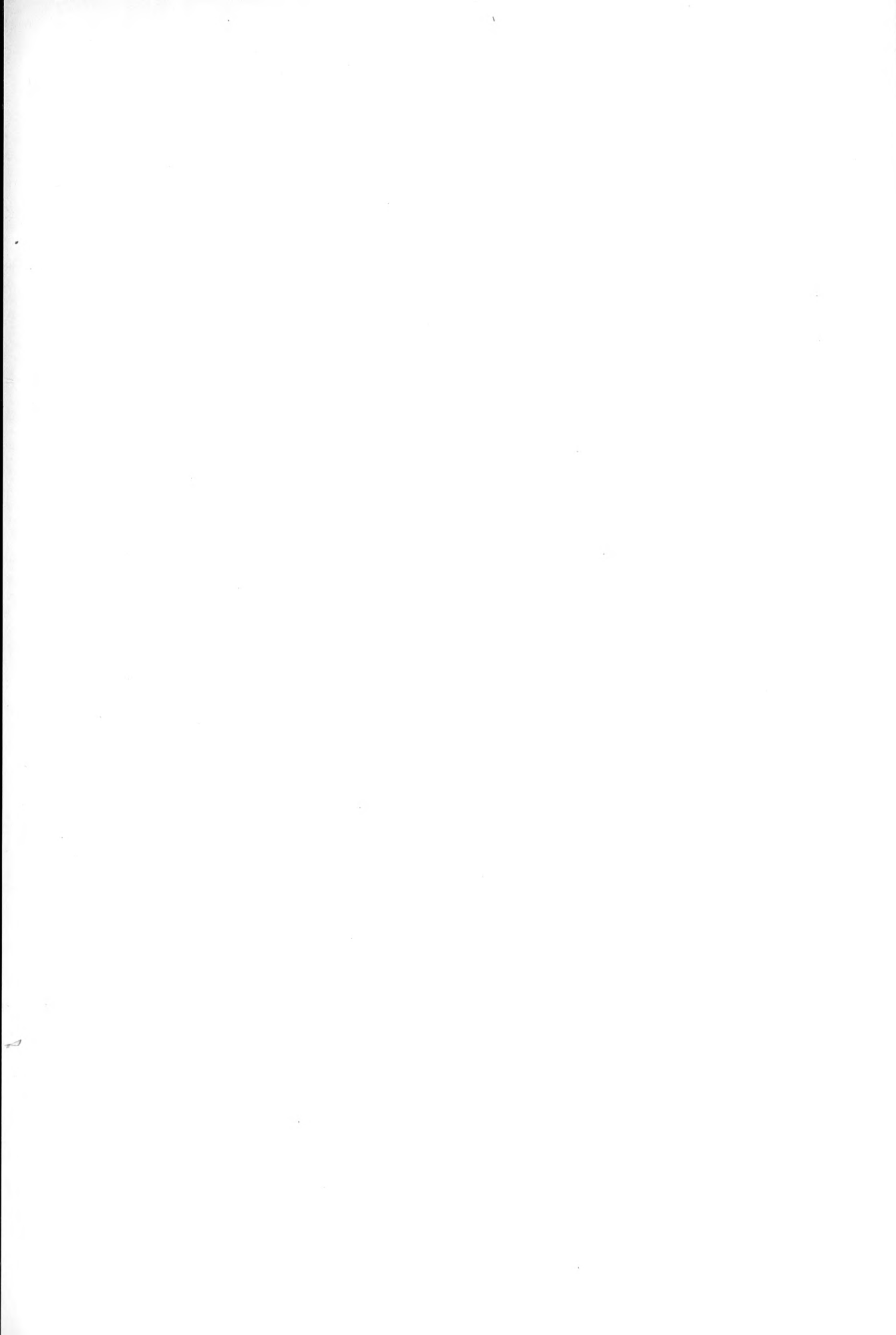


Witnesses:

Jas. F. Coleman
Geo. Robt Taylor

Inventor

Walter H. Miller
Jonas W. Aylsworth
by *Alper & Alper*
Attorneys



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MACHINE FOR MAKING DIPPED PHONOGRAPH RECORDS OR BLANKS.

APPLICATION FILED MAR. 13, 1903.

3 SHEETS—SHEET 3.

Fig. 3

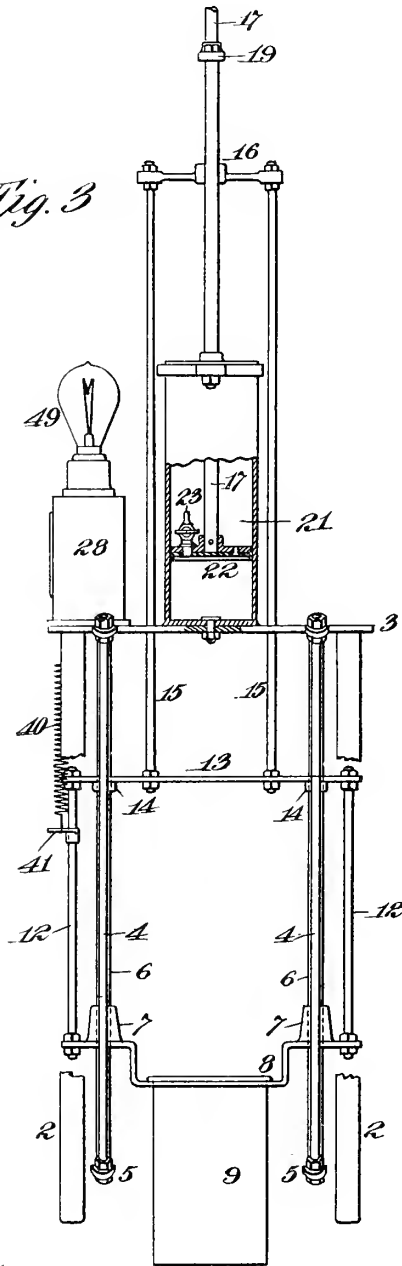
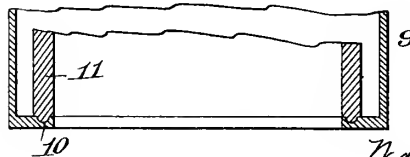


Fig. 4



Witnesses:

Jas. F. Coleman
Dr. Robt Taylor

Inventor

Walter H. Miller
Jonas W. Aylsworth
by *Roper & Roper*
Attorneys

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNORS, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR MAKING DIPPED PHONOGRAPH RECORDS OR BLANKS.

SPECIFICATION forming part of Letters Patent No. 781,893, dated February 7, 1905.

Application filed March 13, 1903. Serial No. 147,606.

To all whom it may concern:

Be it known that we, WALTER H. MILLER, residing at Orange, and JONAS W. AYLSWORTH, residing at East Orange, in the county of Essex and State of New Jersey, both citizens of the United States, have invented a certain new and useful Improvement in Machines for Making Dipped Phonograph Records or Blanks, of which the following is a specification.

Our invention relates to an improved machine which has been designed especially for producing dipped phonograph records and blanks, as described in our Patent No. 683,615, dated October 1, 1901.

With our improved process we introduce a mold, either plain or provided interiorly with a negative representation of a phonographic record, into a molten mass of coagulable wax-like material, the mold being maintained at a lower temperature than the molten material, whereby the latter coagulates thereon to form a layer of the desired thickness. Afterward the mold is removed from the molten material, and the duplicate blank or record thus obtained is first finished on its interior and ends and then separated from the mold by a radial shrinkage. In practice we find that the best results are secured when the mold is immersed in the molten wax-like material with a uniform movement, because if the mold is arrested in its descent even momentarily the material tends to irregularly coagulate thereon and forms objectionable rings and markings in the finished article. In carrying out the special process described in our patent we find also that care has to be taken not to immerse the mold in the material for too long a time, because otherwise the mold becomes objectionably heated and the coagulated layer will tend to drop off. At the same time the mold should not be immersed for too short a period, because otherwise the accumulated layer will not be thick enough. The proper time during which the mold should remain immersed in the molten material depends, obviously, upon the character of the latter, as

well, of course, as upon the temperature of the mold.

The object of our invention is to present an apparatus in simple and effective form wherein the mold will be introduced into the molten material with an absolutely regular movement and wherein a notification will be given to the operator of the expiration of the proper fixed time of immersion.

To this end the invention consists in the features hereinafter set forth and claimed.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a plan view of the apparatus in its preferred form; Fig. 2, a side elevation of the same; Fig. 3, a front view; Fig. 4, a detailed section of the bottom of the dipping-can and mold therein; Fig. 5, a separate elevation of the signal-operating mechanism; Fig. 6, a separate sectional view of the main clock-work-shaft and drum thereon, and Fig. 7 a plan view of the same parts looking in the direction of the arrow Fig. 6.

In all of the above views corresponding parts are represented by the same numerals of reference.

A tank 1 contains the wax-like material maintained in a molten condition, preferably slightly above the melting-point. This tank supports the legs or standards 2 of the dipping apparatus, said legs or standards carrying a top plate or frame 3 at their upper ends. Extending downwardly from the top frame are rods 4 4 at each side, connected together at their lower ends by plates 5. Guide-rods 6 extend between the plates 5 and the top frame 3. Mounted to slide longitudinally of the guide-rods 6 are sleeves 7 7, formed on a yoke 8, having a central opening therein for receiving a dipping-can 9. The bottom of this dipping-can is formed with a groove 10 (see Fig. 4) for receiving a rib on the bottom of the mold 11. By arranging the mold within a dipping-can the former will be surrounded

by air, so as to be kept relatively cool. Connecting-rods 12 extend between the yoke 8 and an upper yoke 13, formed with sleeves 14, also movable on the guide-rods 6. Extending
 5 upwardly from the yoke 13 are connecting-rods 15, secured together at their tops by a cross-head 16, through which extends a rod 17, adjustably connected with the cross-head by a set-screw 18. The rod 17 is guided in a
 10 bearing carried by a stationary yoke 19, supported by standards 20 from the top of a dash-pot cylinder 21. A piston 22 works in this cylinder and connects with the lower end of the rod 17. This piston is provided with
 15 a petcock 23, which may be opened more or less to regulate the descent of the cylinder. Since the piston 22 remains in the upper part of the dash-pot cylinder for a sufficient length of time to permit the mold carrying the de-
 20 posited wax-like material therein to be removed and a fresh mold to be introduced within the dipping-can, opportunity is offered for an equalization of air-pressure on both sides of the piston, so as to do away with the ne-
 25 cessity for providing the latter with special valves.

Depending from the top frame or plate 3 is a latch 24, adapted to engage the yoke 13 when the latter is elevated to maintain the
 30 dipping-can above the level of the molten material. When a mold is to be immersed, it is only necessary to withdraw the latch and permit the parts to descend by gravity. In order to elevate the mold, I connect a cord 25 with
 35 the upper end of the rod 17 and run it over pulleys 26 to a handle 27 within convenient reach of the operator.

In its preferred form the invention employs a signal arranged to give a notification to the
 40 operator when the mold has been immersed for the required length of time. This signal may be either visual or audible; but it is preferably a visual signal, since the use of bells would create confusion in an establishment
 45 where a large number of the machines were used side by side. The mechanism for operating the signal is inclosed in a casing 28 and comprises clockwork mechanism 29 of any suitable type operated from a spring-drum 30.
 50 The clockwork mechanism operates a shaft 31, on which is keyed a ratchet-wheel 32, having fine teeth. Loosely mounted on the shaft 31 is a drum 33, having an integral disk 34, formed with a cut-away portion 35. This disk
 55 is provided on its rear face with a pawl 36 for engaging the ratchet-teeth 32. When the drum 33 is stationary, the clockwork mechanism rotates the ratchet-wheel 32 away from the pawl 36. Extending around the drum 33
 60 is a cord, thread, or fine chain 37, connected with a light spring 38. The drum 33 also carries a cord, thread, or fine chain 39, wound in the same direction as the cord 37 and connected to a heavy spiral spring 40, the lower end
 65 of which is connected to an adjustable arm 41

on one of the connecting-rods 12. The disk 34 is formed with a finger 42, adapted to normally engage with a pin 43, carried on a lever 44, pivoted on the shaft 31 and whose lower end is locked in any position within the slot
 70 45 by a thumb-nut 46. A contact-spring 47, carried on an insulating-block 48, normally occupies a position opposite the slot 45; but when the disk 34 is rotated this contact-spring will engage the periphery of the disk to close
 75 a circuit on a lamp 49, said circuit including the clockwork mechanism, as shown. When an audible signal is desired, this circuit may operate an electric bell.

In operation we proceed as follows: The
 80 dipping-can being elevated and the cross-head 13 being locked by the latch 24, a mold is introduced within the dipping-can and seated in the groove 10. This elevation of the parts releases the tension on the heavy spring 40, so
 85 as to permit the light spring 38 to rotate the drum 33 to bring the finger 42 in engagement with the stop-pin 43. The latch 24 is now released, permitting the mold, dipping-can, cross-head 8, connecting-rods 12, cross-head
 90 13, connecting-rods 15, and piston 22 to descend by gravity. This descent will be uniform and will be controlled by the passage of air through the petcock 23. By opening this petcock more or less the descent of the parts
 95 may be increased or diminished, as will be understood. As soon as the mold is immersed the tension imposed on the strong spring 40 will overcome the tension of the weak spring 38 and will tend to rotate the drum 33 in a
 100 forward direction; but this movement will be resisted by the engagement of the pawl 36 with the ratchet-wheel 32. Consequently the drum 33 cannot move forward any faster than the clockwork mechanism will allow it. As
 105 soon as the rim of the disk 34 engages the contact-spring 47 the circuit will be closed on the lamp 49, and when this occurs the operator will elevate the parts and remove the mold. By varying the position of the stop-pin 43 the
 110 drum 33 will be brought to rest at the desired point to give the correct interval of time between the normal position of the contact-spring 47 and the end of the cut-away portion of the disk 34, so that in this way the period
 115 of immersion of the mold can be varied to any desired extent.

Having now described our invention, what we claim as new therein, and desire to secure
 120 by Letters Patent, is as follows:

1. In apparatus for dipping phonograph records or blanks, the combination with mold-immersing mechanism, of a constantly-operating clockwork, a contact-disk arranged to be coupled to the clockwork by the descent of
 125 the mold-immersing mechanism, and a signal operated from said disk, substantially as set forth.

2. In apparatus for dipping phonograph records or blanks, the combination with mold-
 130

immersing mechanism, of a constantly-operating clockwork, a contact-disk arranged to be coupled to the clockwork by the descent of the mold-immersing mechanism, and a visual signal operated from said disk, substantially as set forth.

3. In apparatus for dipping phonograph records or blanks, the combination with mold-immersing mechanism, of a constantly-operating clockwork, a contact-disk adapted to be connected to the clockwork by the descent of the mold-immersing mechanism, an adjustable stop for limiting the starting position of the disk, and an electric signal controlled by the movements of the disk, substantially as set forth.

4. In apparatus for dipping phonograph records or blanks, the combination of a tank for containing molten material, a support carrying a signaling mechanism and a downwardly-movable mold-carrier, and connections whereby the descent of said mold-carrier causes the signaling mechanism to be set in motion, substantially as set forth.

5. In apparatus for dipping phonograph

records or blanks, the combination of a tank for containing molten material, a support carrying a signaling mechanism and a downwardly-movable mold-carrier, and connections whereby the descent of said mold-carrier causes the production of a signal at a definite time after its descent, substantially as set forth.

6. In an apparatus for dipping phonograph records or blanks, the combination of a tank for containing molten material, a support carrying a signaling mechanism and a downwardly-movable mold-carrier, and connections whereby the descent of said mold-carrier causes the production of a visual signal at a definite time after its descent, substantially as set forth.

This specification signed and witnessed this 9th day of March, 1903.

WALTER H. MILLER.
JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
JNO. ROBT. TAYLOR.



G. LAUDET.

APPARATUS FOR THE REPRODUCTION AND AMPLIFICATION OF SOUND.

APPLICATION FILED DEC. 1, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

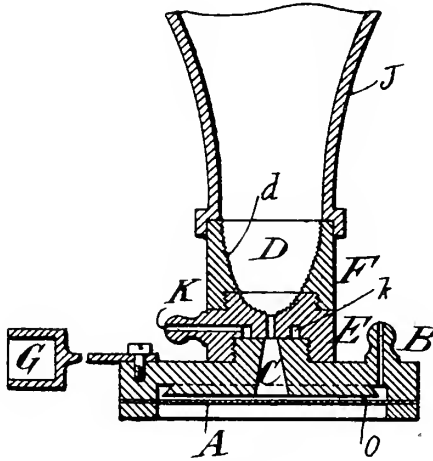


Fig. 2.

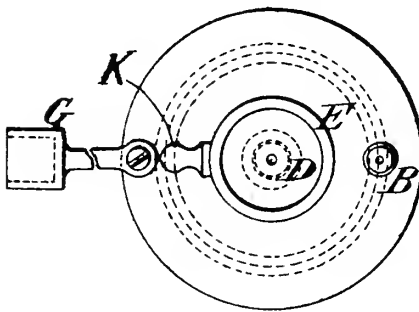


Fig. 5.



Fig. 3.

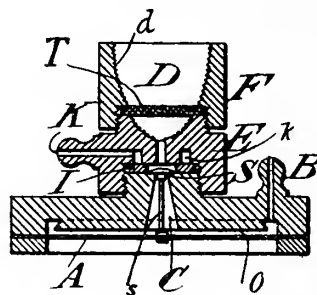


Fig. 4.

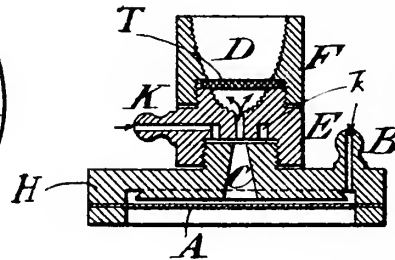


Fig. 6.



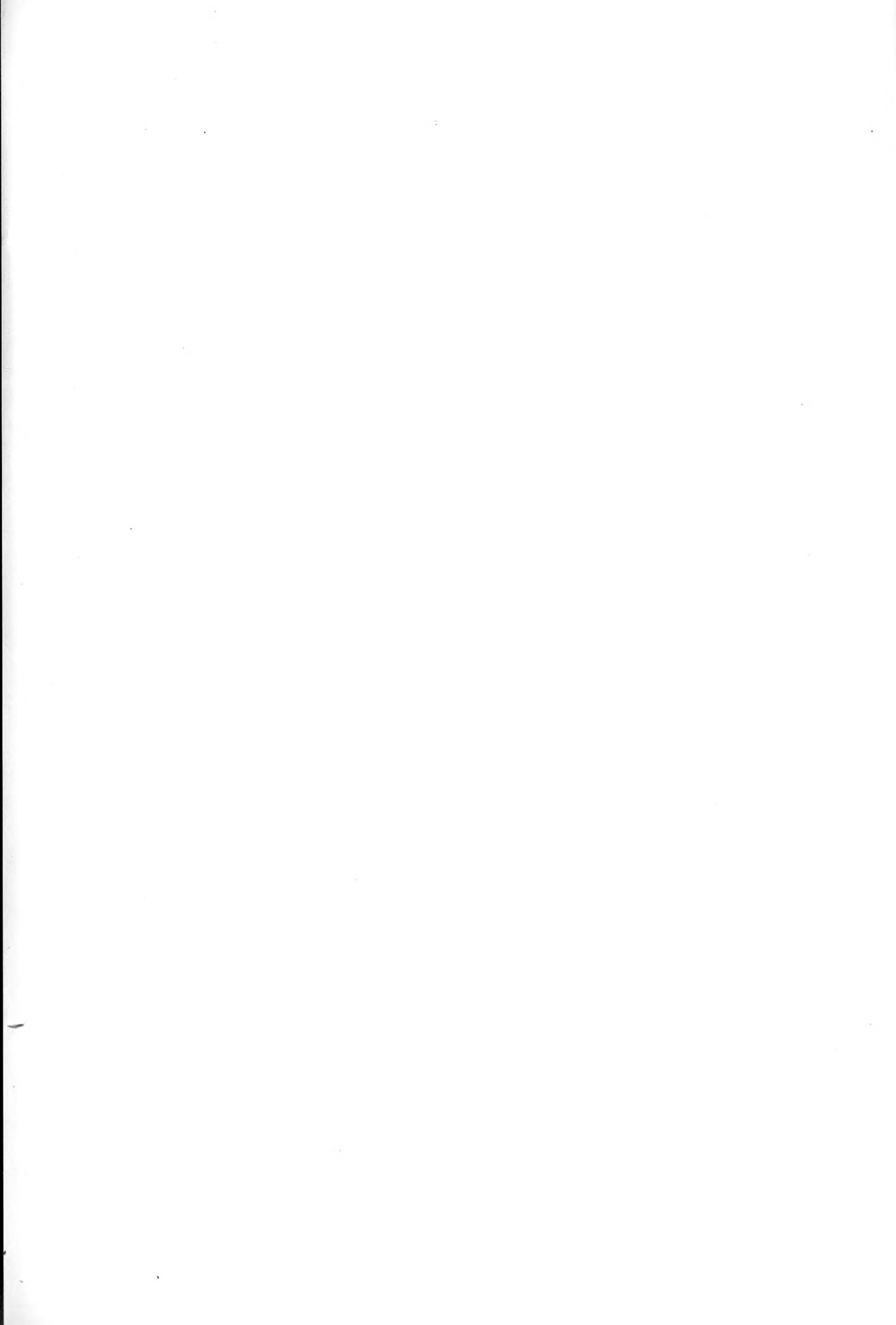
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William J. Cook

Inventor:

Georges Laudet

By Henry Cannon
 att. Horn 1903



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APPARATUS FOR THE REPRODUCTION AND AMPLIFICATION OF SOUND.

APPLICATION FILED DEC. 1, 1903.

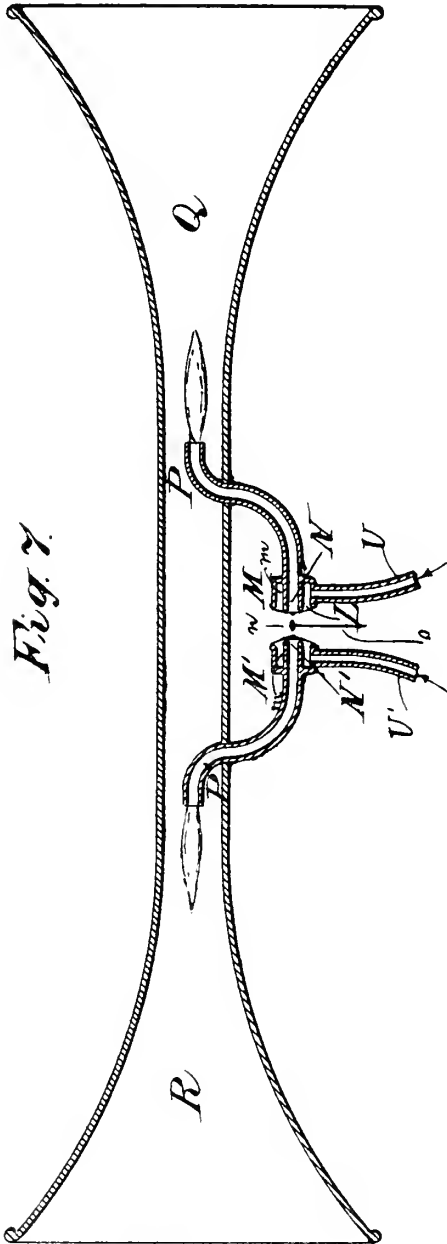


Fig. 7.

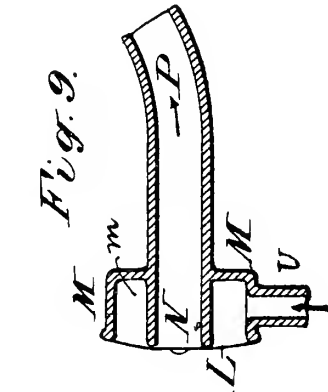


Fig. 9.

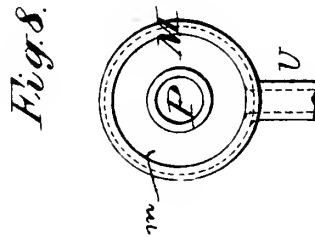


Fig. 8.

Witnesses:

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William J. Fitch

Inventor:
 Georges Laudet

By *Henry Cannon*
 Attorney

UNITED STATES PATENT OFFICE.

GEORGES LAUDET, OF MEUDON, FRANCE.

APPARATUS FOR THE REPRODUCTION AND AMPLIFICATION OF SOUND.

SPECIFICATION forming part of Letters Patent No. 782,146, dated February 7, 1905.

Application filed December 1, 1903. Serial No. 183,365.

To all whom it may concern:

Be it known that I, GEORGES LAUDET, a citizen of the French Republic, residing at Meudon, Seine-et-Oise, France, have invented certain new and useful Improvements in Means for the Reproduction and Amplification of Sounds, of which the following is a specification.

This invention relates to means for the production of amplified sounds of any kind—such as noises, spoken words, musical sounds, and the like; and it resides in means whereby a diaphragm which is itself vibrated by sounds acts to control the distribution of a detonating gas or gaseous mixture of a combustible nature in such a manner that the vibrations of the diaphragm has the effect of continuously modifying the amplitude of the detonations of the ignited gases proportionately to the amplitude of the vibrations of the diaphragm which controls them, the detonations being reproduced in sounds emitted by the apparatus which are very much stronger than those which have been received by the vibrating diaphragm. Such is the principle on which rests the operation of reproduction and amplification of sounds by means which will be hereinafter described with reference to the accompanying drawings, which show several forms of apparatus for carrying out the invention.

In said drawings, Figure 1 is a vertical axial section of the apparatus. Fig. 2 is a plan thereof. Figs. 3 and 4 are sectional views showing slight variations in the construction. Fig. 5 is a detached view of the diaphragm and valve of the construction seen in Fig. 3. Fig. 6 is a plan view of a washer seen in Fig. 3. Fig. 7 is a sectional elevation of a form of the apparatus which is actuated by gas at high pressure. Figs. 8 and 9 are detached and enlarged sectional views of the chamber where the gaseous mixture is received in the construction of Fig. 7, the former being a transverse section and the latter an axial section.

Referring primarily to Figs. 1 and 2, H designates a box, here shown as facing downward. On the back of this box is a screw-threaded nipple, on which is screwed a section E, and on this section is screwed another sec-

tion, F. On the section F is secured the base of a horn or megaphone J for augmenting sounds. Only a part of this horn is shown in Fig. 1. Across the lower end or face of the box H is secured a diaphragm A, capable of vibrating under the influence of sounds. Back of the diaphragm and in the box H is a chamber O, to which a gas or mixture of gases may be admitted at an inlet B, and up through the box H and section E is a passage C, through which the gases may pass to a burner-chamber D, formed in the sections E and F and open to or housed by the megaphone J. To the chamber O is admitted a combustible gaseous mixture, and this mixture may be, for example, composed of illuminating-gas and air or air and acetylene or the gaseous vapor of a volatile liquid mixed with air. If the diaphragm A is not vibrating, the gaseous combustible mixture back of the diaphragm remains in the chamber provided for it; but under the influence of vibrations of the diaphragm the chamber O back of the latter will be found to vary in capacity incessantly. From this it results that there will be successive aspirations and evacuations of some part of the gaseous mixture at the passage C. The gaseous mixture burns in passing out through the passage E to the burner-chamber D, thus producing a series of rapid detonations, due to the successive jetting out of portions of the mixture through the passage C under the influence of the vibrations of the diaphragm, the successive quantities emitted or jetted out varying with the amplification of such vibrations. The gaseous mixture is maintained ignited because of the rapid succession of the detonations and also by reason of certain asperities *d* on the walls of the chamber D. These asperities form an obstacle to the easy flow of the gaseous mixture along the walls of the chamber D, and thus escaping into the horn J before producing the full effect of detonating for effecting amplification of the sounds. These asperities, moreover, augment the metallic surface at the contact of which the successive detonations of the gaseous mixture are effected.

In place of admitting the mixed gases at the inlet B we may admit but one gas at this in-

let—as, for instance, the air—the other gas being admitted at an inlet K. This second gaseous element, which contributes to form the combustible mixture, enters an annular space *k*, formed in the section E, from which space it finds its way to the passage C, where the gaseous elements mix before entering the chamber D.

This apparatus can amplify and reproduce not only vibrations which act directly on the diaphragm A, but on vibrations analogous to those received in the reproducer of a phonographic apparatus under the influence of undulations registered by impression on a cylinder or disk. In this case the box H carries, as seen in Figs. 1 and 2, a piece G, which may be adapted directly to the reproducer of a phonograph. In this case the entire apparatus receives the vibrations of the reproducer and produces fluctuations of the gaseous mixture back of the diaphragm. The gas escapes by more or less important fractions through the passage C to the chamber D for producing successive detonations therein.

If the pressure or tension of the gaseous mixture is great, we may dispose between the section E and box H, as seen in Figs. 3 and 6, a washer I and in the aperture in said washer mount a valve S on a stem *s*, which connects the valve with the diaphragm A. In Fig. 5 said connected diaphragm and valve may be seen detached. This valve closes more or less the passage or orifice C and prevents the gas from flowing through the same too rapidly, which latter would be injurious to the production of suitable detonations and the resultant vibrations.

If the vibrations received by the diaphragm A are sufficiently energetic to cause the mixture of gases to be forced strongly through the orifice or passage C, we may place between the sections E and F one or more disks of wire-gauze T (see Fig. 3) and between or on these disks place some fragmentary substance, if necessary, to detain the outflow of gas and maintain conditions suitable for producing the best results. The shock and friction of the impact of the gas against these particles or fragments serves only to augment the sonority of the vibrations.

In the form of the apparatus illustrated in Figs. 7, 8, and 9, and which employs gas at a high pressure, a relatively small diaphragm L is placed over a box M and controls the inlet N of a conduit P. The gaseous detonating mixture supplied by a pipe U enters an annular chamber *m* in the box M and acting on the inner face of the diaphragm L passes it outward slightly and passing through the narrow opening thus made enters the pipe P. This pipe enters at one side of the point of junction between two horns or megaphones Q R and forms a jet in the horn Q. The gaseous mixture will obviously be admitted to the tube or pipe P proportionately to the

vibrations of the diaphragm, which tend to vary the size of the inlet N. Obviously, also, the pipe P may connect with the end of a horn, as shown in Fig. 1, through a chamber D; but, as shown in Fig. 7, the gaseous mixture on issuing from the pipe P burns in a long flame in the axis of the horn and directed toward its open end. This figure shows the apparatus constructed in a double form, the parts at the left being distinguished from those at the right by prime-marks on the reference-letters. In this double construction there is disposed between the centers of the two diaphragms L and L' a short transversely-disposed pin *n* on a flexible stem *o*. This pin holds one diaphragm so as to shut off the gas whenever the other is open or pressed outward, the diaphragm which is thus pressed outward impinging on said pin *n* and pressing it forcibly against the opposite diaphragm. The flexible stem *o* permits of this movement of the pin. Thus the orifice N will be closed whenever the orifice N' is open. If the quantity of the gaseous mixture which is emitted at the burners of the two pipes P and P' were always equal, the air contained in the space at the junction of the horns Q and R would be immovable. If one of the burners has the advantage, this establishes in that direction a flow of air which is continually being modified by the variations in the quantities of gas being detonated at the different burning-points, thus producing much amplified sounds.

It will be noted that the burner or point of ignition of the gas is in all cases housed in or by the base portion of the horn or megaphone J. In Figs. 1 and 3, for example, the burner or burner-chamber D forms operatively a part of the base of the megaphone, while in Fig. 7 the outlet of pipe P is the burner, and this burner is housed in the base or narrower part of the megaphone Q. In Fig. 1 also the diaphragm A forms one wall of the gas-chamber O and by its vibrations rapidly varies the capacity of this chamber. Thus in this construction of Fig. 1 the operation is similar to that of a bellows, the gas being under no material tension, while in Fig. 7, where the gas is under some tension or pressure, the diaphragm acts as a valve.

The asperities *r* in the burner-chamber D may be of any kind—as, for example, such as would be formed by cutting V grooves in the walls and extending roundwise thereof.

Having thus described my invention, I claim—

1. An apparatus for the purpose specified, having a diaphragm, a gas-chamber back of the diaphragm, a burner, a conduit which connects said gas-chamber with the burner, and a horn or megaphone housing the burner, said diaphragm controlling by its vibrations the supply of gas to said burner.

2. An apparatus for the purpose specified,

having a horn or megaphone, a gas-burner housed thereby, means for supplying gas to said burner, and a diaphragm controlling by its vibrations the supply of gas to said burner.

5 3. An apparatus for the purpose specified, having a horn or megaphone for augmenting sounds, a gas-chamber, a burner-chamber D housed at the base of the megaphone, a gas-
10 passage connecting said gas-chamber with the burner-chamber, and a diaphragm forming one wall of the gas-chamber and serving, by its vibrations, to vary the capacity of said chamber proportionate to the amplification of the vibrations.

15 4. An apparatus for the purpose specified, having a horn or megaphone for augmenting sounds, a gas-chamber, a diaphragm which forms one wall of said chamber and by its vibrations varies the capacity of the latter, a
20 burner-chamber D, having roughened walls, said chamber being housed at the base of the megaphone, and a conduit connecting the gas-chamber with the burner-chamber.

25 5. An apparatus for the purpose specified, having a horn or megaphone for augmenting sounds, a gas-chamber, a diaphragm which forms one wall of said gas-chamber and by its vibrations varies the capacity of the latter, a burner-chamber housed at the base of
30 the megaphone, a conduit connecting the gas-

chamber with the burner-chamber, and a valve connected operatively with the diaphragm and controlling the flow of gas through said conduit.

6. An apparatus for the purpose specified, 35 having a horn or megaphone for augmenting sounds, a gas-chamber, a diaphragm which forms one wall of the gas-chamber and by its vibrations varies the capacity of said chamber, a burner-chamber, a conduit connecting the
40 said gas-chamber and burner-chamber, and a foraminous diaphragm T at the base of the burner-chamber to somewhat obstruct the flow of the gas to the burning-point.

7. An apparatus for the purpose specified, 45 comprising a box H having in it a gas-chamber O, an inlet B, an inlet K, and an outlet-conduit C, sections E and F, having in them a burner-chamber D, a megaphone J, connected
50 with the section F and housing the chamber D, and a vibrant diaphragm A, forming one wall of the gas-chamber O.

In testimony whereof I have hereunto signed my name, this 19th day of November, 1903, in the presence of two subscribing witnesses. 55

GEORGES LAUDET.

Witnesses:

JULES ARMENGAUD, Jeune,
H. C. COXE.



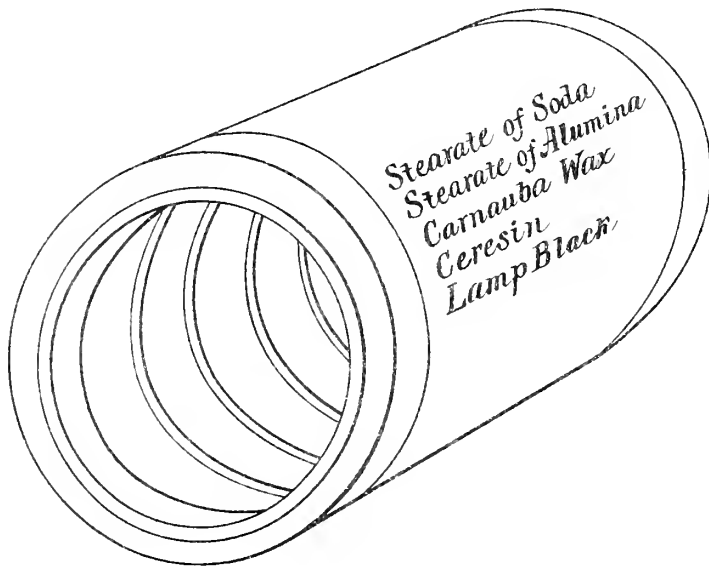
No. 782,375.

PATENTED FEB. 14, 1905.

J. W. AYLSWORTH.

COMPOSITION FOR MAKING DUPLICATE PHONOGRAPH RECORDS.

APPLICATION FILED NOV. 3, 1903.



Attest:

Edgar A. Adams
Delos Holden

Inventor:

Jonas W. Aylsworth
by *Frank L. Piper*
Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A COR-
PORATION OF NEW JERSEY.

COMPOSITION FOR MAKING DUPLICATE PHONOGRAPH-RECORDS.

SPECIFICATION forming part of Letters Patent No. 782,375, dated February 14, 1905.

Application filed November 3, 1903. Serial No. 179,729.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain Improvements in Compositions for Making Duplicate Phonograph-Records, of which the following is a description.

My invention relates to a new composition adapted particularly for making duplicate phonograph-records obtained by any suitable process from a matrix or mold; but the composition has been gotten up especially for making duplicate phonograph-records obtained by the process described in patent to Miller and Aylsworth, No. 683,615, dated October 1, 1901, and wherein a suitable mold carrying on its bore the negative representation of the record to be duplicated is immersed in a molten wax-like coagulable material, which forms a coagulated layer of the desired thickness on the bore of the mold, after which the material is reamed out internally while warm and the resulting duplicate removed by shrinking diametrically and removing the same longitudinally from the mold, its ends being finally finished. The desirable properties or characteristics of my improved composition are such, however, that it may be effectively utilized for the manufacture of duplicate phonograph-records obtained by means of any process wherein material in a molten or plastic condition is introduced into a matrix or mold and is allowed to set or is expanded therein so as to take an impression, being removed by diametric shrinkage sufficient to clear the engaging surfaces.

A composition suitable for the purpose should have certain peculiarities, which I have been able to secure only after long experiment. In the first place, the composition should be very limpid when in a molten or plastic state, so as to flow into intimate engagement or contact with the record-surface, and thereby permit a very sharp impression to be received. It should be free of decomposition products,

which would otherwise result in the generation of gas, forming bubbles, which would destroy the commercial character of the record-surface. It should be of excessively-fine texture or grain, so as not to produce extraneous sounds when the reproducer rubs over it. It should be very hard when set, so as to reduce wear as much as possible, due to the tracking of the reproducer. It should have the capacity of passing from the liquid to the solid state through an intermediate condition of gradually-reduced plasticity, to thereby enable the duplicate to shrink internally and toward the surface, so as not to clear the mold until quite hard, to thereby preserve the record, instead of chilling very rapidly at the surface to form a relatively hard film, which tends to shrink away from the mold even when the mass of the material is still molten, since I find that materials having this latter characteristic are not suitable for the purpose, owing to the danger of the record-surface being injured under the effect of the unequal chilling. It should not be sticky or tenacious, so as to adhere to the mold when set, even to the smallest extent. It should be capable of shrinking away from the mold when quite hard by a reduction in its temperature. It should have a very smooth and polished surface, so as to eliminate foreign noises due to the tracking of the reproducer. It should be free from air and gas bubbles, which if present at the surface would destroy the commercial character of any duplicates containing them. It should shrink uniformly without warping, so as to be capable of effective use with standard talking-machines. It should not be affected by moisture, so as to be preserved in damp climates, and it should have a high melting-point, so as not to soften in hot localities. When hot, it should be capable of being cleanly cut in reaming without dragging or chipping, so as to present a smooth clean surface on the bore of the duplicate. Preferably it should be of a very dark color to permit imperfections to be better observed. It should be perfectly amor-

phous and non-crystalline, since the latter materials harden very quickly at the surface when their congealing temperature is reached and shrink irregularly, with the objections 5 pointed out. The composition which I have invented and which will be herein described is one possessing these characteristics, and hence is especially adapted for use in this art.

In describing my improved composition 10 and the process which I prefer to follow in compounding the same I shall refer to preferable proportions of ingredients, to preferable steps or procedures in the process, and to preferable temperatures, all based on actual 15 practical experience in this art; but it will be understood that in these respects considerable variations may be made, as will be obvious to those skilled in the art.

Reference is hereby made to the accompanying drawing, which shows in perspective a 20 phonograph-record having inscribed thereon the names of ingredients which are preferably used in the preparation of my invention.

In making my improved composition I prefer 25 to proceed, therefore, substantially as follows:

I first take one hundred pounds of commercial stearic acid, which, as is known, is generally a mixture of stearic and palmitic acids, 30 and melt the same in a suitable galvanized-iron caldron or other vessel at a temperature of about 240° Fahrenheit. The stearic acid used melts at about 136° Fahrenheit. Care should be taken to see that the stearic acid is 35 substantially free from oleic acid, as well as from mineral acids, salts, glycerin, and undecomposed fats, as tallow, &c. It should also be free from mucilaginous substances and hydrocarbons. When the stearic acid is fully 40 melted, I then add to the same a water solution of carbonate of soda and aluminate of soda, obtained, preferably, in the following way: I first dissolve twenty-one and a half 45 pounds of recrystallized sodium carbonate, in a suitable steam-jacketed caldron of about twenty gallons capacity, in ten gallons of water, and I add to the solution four hundred and fifty-two grams of caustic soda of the best 50 grade of the commercial article. When all is dissolved, I add one hundred and seventy-five grams of metallic aluminium, preferably in the form of pieces about three inches by twelve inches square and twenty one-thousandths of an inch in thickness. When the 55 metal is added to the solution, I turn off the heat and allow the metal to dissolve, which takes place inside of three hours. When all the metal is dissolved, the solution is filtered while still hot in a filter-press or in any other 60 way. In adding the alkaline solution to the melted stearic acid I gradually raise the temperature of the latter so as to correspond with the increased melting-point of the mixture.

The alkaline solution is added as rapidly as 65 possible without unduly running the temperature down or causing excessive boiling or foaming. The solution can be added quite rapidly at first; but toward the end it must be added very slowly. The addition of the alkaline 70 solution to the stearic acid results in the production of stearates and palmitates of soda and of aluminium, the latter being metallic soaps or metallic salts of fatty acids. During the saponification which thus takes place water 75 is driven off. At the end of the operation the temperature will have gradually run up to about 360° Fahrenheit. I now add to the molten metallic-soap mixture twenty-one and thirty-six hundredths pounds of a very hard 80 wax, preferably carnauba, the latter consisting of a mixture or combination of the higher fatty acids and alcohols. The carnauba-wax used should be as clean as possible, and it may be purified by melting the same with an equal 85 weight of water, heating by a jet of direct steam and boiling for a short time, then drawing off or evaporating the water, after which it may be poured into pans, where it is allowed to cool into cakes suitable for weighing. 90 When the carnauba-wax is added to the soap mixture, the temperature of the mass is raised to about 450° Fahrenheit and maintained until all foaming ceases, which usually takes about five hours. By thus subjecting the mixture to a relatively high heat a combination 95 is effected between the alcohols of the carnauba-wax and the excessive stearic acid present in the metallic-soap composition, forming a hard wax-like compound ether, which gives to the composition many of its desirable characteristics. Unless the carnauba-wax is heated 100 materially beyond its melting-point, resulting in the reaction referred to taking place, the composition, although harder, is very brittle and shrinks excessively and is therefore 105 not so desirable as when the high heating is effected. Furthermore, unless this is done there is greater likelihood of decomposable products remaining in the composition, affecting the character thereof and resulting in 110 the production of bubbles in the surface of the resulting duplicate.

After the treatment of the molten material at a high temperature has been effected and all foaming has ceased I add twenty-one and 115 thirty-six hundredths pounds of ceresin thereto, although other hydrocarbon waxes may be employed, such as paraffin or ozocerite. The purpose of this latter ingredient is to make the mixture non-hygroscopic and also 120 less brittle than it otherwise would be. When ceresin is used, its melting-point should be, preferably, about 145° Fahrenheit, and in any event as high as can be obtained, and it should 125 present a fine grain on fracture and should be free from paraffin.

For the purpose of darkly coloring the composition a suitable amount of fine pure lampblack—say from .9 per cent. to three per cent. thereof—or other suitable inert finely-pulverized pigment may be added to the molten mass at any stage of the operation. Preferably, however, the coloring-matter is added together with the carnauba-wax.

After the ceresin is added and thoroughly incorporated with the mixture the congealing temperature of the latter may be regulated by adding free stearic acid thereto. In using the process described in the patent to Miller and Aylsworth, before referred to, I prefer to adjust the congealing-point of the mixture at about 290° Fahrenheit, since excellent commercial results have been secured at that temperature. I find that in dealing with temperatures above 290° Fahrenheit the addition of one per cent., by weight, of stearic acid effects a drop of about 5° Fahrenheit in the congealing-point. Obviously this regulation of the congealing-point of the mixture depends upon the special process which is to be followed in making duplicates, and where the congealing temperature is not important no attention whatever need be paid to its regulation. The material is now strained, preferably through open muslin, and is ready for use.

While I prefer in all cases to make use of carnauba-wax, as described, yet I find that beeswax and Chinese wax and palm-wax all contain alcohols somewhat similar to those of carnauba-wax and by which substantially similar reactions take place. These materials may therefore be substituted for the carnauba-wax, but always at a sacrifice in the desirable condition of the resulting products.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. A composition for phonograph recording-surfaces, comprising a metallic soap and a hard wax added thereto, substantially as set forth.

2. A composition for phonograph recording-surfaces, comprising a metallic soap and carnauba-wax added thereto, substantially as set forth.

3. A composition for phonograph recording-surfaces, comprising a mixture of metallic soap, a hard wax and a non-hygroscopic ingredient, substantially as set forth.

4. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, a hard wax, and ceresin, substantially as set forth.

5. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, carnauba-wax and a non-hygroscopic ingredient, substantially as set forth.

6. A composition for phonograph recording-surfaces, comprising a mixture of a metallic

soap, carnauba-wax and ceresin, substantially as set forth.

7. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap and a wax-like compound ether, substantially as set forth.

8. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, a wax-like compound ether, and a non-hygroscopic ingredient, substantially as set forth.

9. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, a wax-like compound ether and ceresin, substantially as set forth.

10. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, a hard wax and a black pigment, substantially as set forth.

11. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, a hard wax and lampblack, substantially as set forth.

12. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, carnauba-wax and a black pigment, substantially as set forth.

13. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, carnauba-wax and lampblack, substantially as set forth.

14. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, carnauba-wax, ceresin and a black pigment, substantially as set forth.

15. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, carnauba-wax, ceresin and lampblack, substantially as set forth.

16. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, a wax-like compound ether, and a black pigment, substantially as set forth.

17. A composition for phonograph recording-surfaces, comprising a mixture of a metallic soap, a wax-like compound ether and lampblack, substantially as set forth.

18. A composition for phonograph recording-surfaces, comprising a mixture of stearate of soda, carnauba-wax, and a non-hygroscopic ingredient, substantially as set forth.

19. A composition for phonograph recording-surfaces, comprising a mixture of stearate of soda, carnauba-wax and ceresin, substantially as set forth.

20. A composition for phonograph recording-surfaces, comprising a mixture of stearate of soda, carnauba-wax and a black pigment, substantially as set forth.

21. A composition for phonograph recording-surfaces, comprising a stearate of soda, carnauba-wax and lampblack, substantially as set forth.

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22. A composition for phonograph recording-surfaces, comprising a mixture of stearate of soda, stearate of alumina, and carnauba-wax, substantially as set forth.

5 23. A composition for phonograph recording-surfaces, comprising a mixture of stearate of soda, stearate of alumina, carnauba-wax and lampblack, substantially as set forth.

10 24. A composition for phonograph recording-surfaces, comprising a mixture of stearate

of soda, stearate of alumina, carnauba-wax, ceresin and lampblack, substantially as set forth.

This specification signed and witnessed this 29th day of October, 1903.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,

WILLIAM A. DOLAN.



G. K. CHENEY.
PROCESS OF DUPLICATING MATRICES.
APPLICATION FILED JUNE 8, 1903.

Fig. 1.

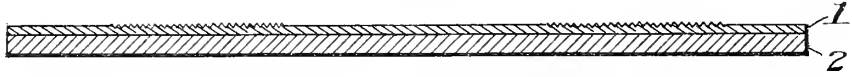


Fig. 2.

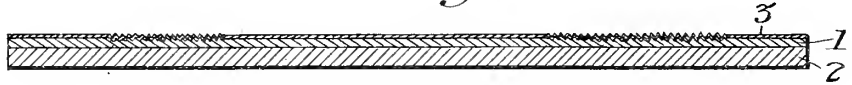


Fig. 3.

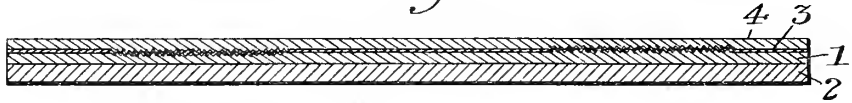


Fig. 4.

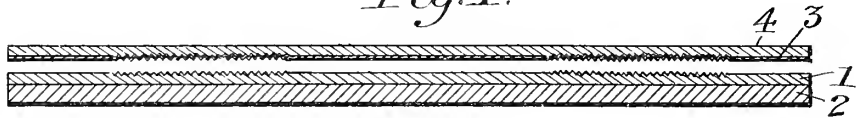


Fig. 5.

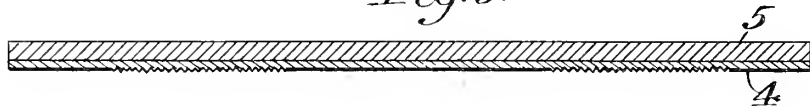
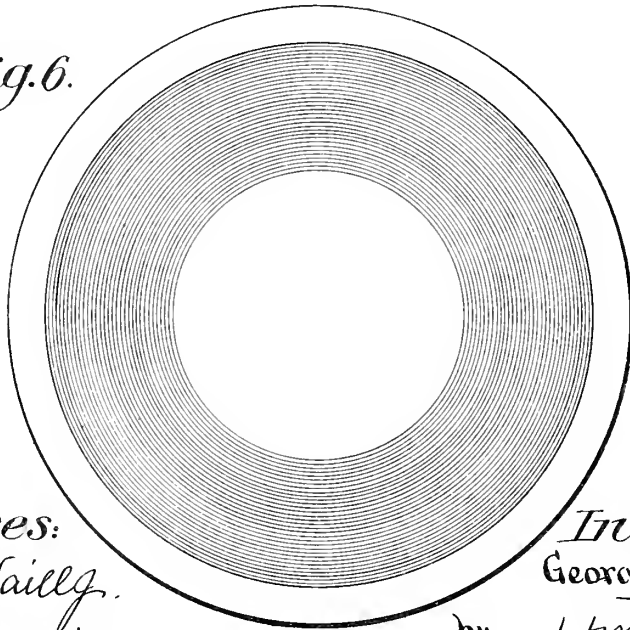


Fig. 6.



Witnesses:

Edw. W. Vailly.
Henry C. B. Kennedy.

Inventor:
George K. Cheney

by *H. M. Pettit,*
Attorney.

UNITED STATES PATENT OFFICE.

GEORGE K. CHENEY, OF NEW YORK, N. Y.

PROCESS OF DUPLICATING MATRICES.

SPECIFICATION forming part of Letters Patent No. 783,176, dated February 21, 1905.

Application filed June 6, 1903. Serial No. 160,434.

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Processes of Duplicating Matrices, of which the following is a specification.

My invention relates generally to sound-records for talking-machines and more particularly to a new and improved process for duplicating the matrices employed in stamping up such records.

Heretofore it has been the practice in recording sound for reproduction to first make a master-record in the form a soft-wax tablet and produce a metallic negative therefrom by a process of electrodeposition, the negative being subsequently backed and faced to serve as a die or matrix for use in stamping up commercial records, such as may be purchased in the open market. As the sale of these records is continually increasing and as the average life of a matrix is ordinarily limited to the production of a thousand or less clean sharp impressions, it is found necessary in meeting the demand to renew the matrix by providing a second, third, and oftentimes a fourth and fifth duplicate. The duplication of the matrix is attended with more or less difficulty and involves considerable time, labor, and expense, as the soft-wax master deteriorates rapidly and becomes hopelessly worn and unfit for further use after a second or possibly a third electrotype has been made therefrom. It also requires great care in handling and storage to protect it from mutilation and atmospheric changes, &c. The life of the master-record being thus limited, as above stated, it must sooner or later be reproduced if additional duplicates of the matrix are required, and it therefore becomes necessary to recall vocalists, musicians, or other artists to repeat the song, &c. Ordinarily considerable delay is experienced in securing the attendance of these artists, as they are usually traveling from place to place, and in addition to the expense for such services the second master may lack the spirit, tone quality, and merit of the original to such

an extent as to prove wholly unattractive to the buying public.

In view of the foregoing the present invention is designed to dispense with further use of the soft-wax master after the first electrotype is made therefrom and to employ such electrotype or negative in making a positive electrotype or permanent record, from which any number of negative matrices may be subsequently produced in a manner to be hereinafter more fully explained. The advantages of this method will be apparent, as in making a duplicate matrix from an electrotype, which latter I shall hereinafter term the "positive," such electrotype is not subjected to appreciable or, in fact, any wear, as it serves merely for use as a form on which metal is deposited electrolytically—that is to say, for the production of negative electrotypes in any desired number, which after being separated from the positive and properly backed and faced, are employed as dies or matrices for stamping up commercial records. For a detailed description of one application of this method reference may be had to the following paragraphs and to the accompanying drawings, forming a part of the specification, in which—

Figure 1 is a sectional view of a matrix or duplicate original record with its backing; Fig. 2, a similar sectional view showing the conductive film or coating applied thereto; Fig. 3 is a similar sectional view to Fig. 2, but showing the electrodeposit thereon. Fig. 4 is a similar sectional view of the same parts as in Fig. 3, but showing the electrotype or the last deposit separated from the duplicate original or matrix; Fig. 5, a similar sectional view showing the last electrotype backed in the usual manner; and Fig. 6, a plan view of the duplicate original or matrix, said plan view also serving to indicate the lower surface of the electrotype taken from the duplicate original or matrix.

The duplication of a negative matrix by my improved process is as follows: A master sound-record is produced in any suitable or well-known manner—as, for example, by recording directly upon the surface of a tablet of wax-like or other material—and a negative

5 électrotype 1 is made therefrom in the usual
 manner by a process of electrodeposition. I
 wish it understood, however, that I do not
 limit myself to a particular method of pro-
 10 ducing the original negative, as it may be
 molded, stamped up, or otherwise formed
 and will serve the purpose of the present in-
 vention. Such a negative 1 is employed to
 15 obtain a positive electrotype 1 by having the
 record-surface thereof first thoroughly washed
 with alcohol, benzin, or the like and then
 coated with a solution suitable for forming a
 20 conducting-surface 3, on which metal may be
 deposited electrolytically and which at the
 same time will serve as a protective covering
 by preventing the metal 4 thus deposited from
 25 adhering directly to the record-surface of the
 negative. By coating the surface of the nega-
 tive or matrix with a solution of a material
 which is conductive and which also has the
 property of being easily separated from the
 30 negative without requiring the destruction of
 the negative by eating the same away with
 acids or by electrolytic decomposition or re-
 moval the process of making the duplicate
 original is much simplified and the cost of time
 and material greatly reduced. My method of
 35 duplicating an original record also has many
 advantages and material differences over those
 methods in which the matrix is formed of
 gelatin or layers of gelatin and other sub-
 stances from which original wax record is re-
 moved and its place taken by a celluloid coat-
 40 ing or layers of celluloid and gelatin to form
 the duplicate. The use of gelatin involves a
 great expense of time and extreme care, while
 at the same time the records duplicated are
 liable to be untrue, uneven, and warped, owing
 45 to the unequal expansion or contraction during
 the drying or hardening process. My process
 also allows the original negative or matrix
 to be preserved and used repeatedly.

Any solution which has the properties above
 described of giving a conductive coating to
 50 the matrix without adhering too closely to the
 same may be used; but I preferably employ
 the following ingredients in about the propor-
 tions stated: bisulfid of carbon, seven ounces;
 phosphorus, one-half ounce; beeswax, one-half
 55 ounce; spirits of turpentine, six ounces; as-
 phaltum, one-half ounce. Such a solution in
 addition to forming a conducting-surface and
 protecting the negative from direct deposition
 of metal permits the positive electrotype 4
 60 to be readily separated from the negative 1
 with little effort and without marring or en-
 dangering either record-surface. After the
 solution of conductive material has spread
 upon the surface of the metallic matrix and
 65 allowed to dry or harden copper or other metal
 is electrolytically deposited upon the same.
 The matrix and copper positive or dupli-
 cate record thus formed are then separated
 manually or in any convenient manner. The
 copper positive thus produced after being

70 backed with metal 5 is identical in all re-
 spects to the ordinary commercial record and
 is preserved as a permanent record from which
 duplicate negative matrices may be made in
 any number desired without appreciable wear
 or deterioration of the same. To now pro-
 75 duce such a duplicate negative, the positive
 after being washed with alcohol or benzin
 is given a film-coating of the solution above
 referred to and electroplated. When a suffi-
 80 cient depth of metal has deposited, it is re-
 moved from the tank, and owing to the pres-
 ence of the interposed film between the positive
 and negative electrotypes they may be readily
 separated. The negative after being backed
 85 and faced in the usual manner is ready for
 use in the press as a matrix in stamping up
 commercial records. This part of the pro-
 cess it is not necessary to separately illustrate
 by drawings, as the present figures of the
 90 drawings clearly indicate the steps, which are
 similar to that of producing the duplicate
 original. Thus it will be seen that the num-
 ber of matrices which may be thus produced
 from the positive is unlimited. The time, la-
 95 bor, and expense over the present methods are
 greatly reduced and the necessity for recall-
 ing artists is obviated. The positive or origi-
 nal from which such duplicates are made will
 last indefinitely with ordinary care, as it is
 not appreciably affected by changes in atmos-
 100 phere or temperature and will not deteriorate-
 or wear in use.

Having therefore described my invention, I
 claim—

1. The method of obtaining a reverse metal-
 lic copy of a metallic record or matrix which
 comprises, first, coating the record or matrix
 with a film of electrically-conductive but de-
 105 tachable material; second, electroplating said
 film, and, third, separating the metallic layers.

2. The method of obtaining a reverse metal-
 lic copy of a metallic record or matrix which
 comprises the following steps: first, coating
 the record or matrix with a film of electric-
 110 ally-conductive but detachable material; sec-
 ond, electroplating said film; third, separating
 the metallic layers, and, fourth, backing up
 the last-named electroplate.

3. The method of duplicating metallic sound-
 115 record matrices, which comprises, first, dupli-
 cating the master-record in metal; second, ap-
 plying a film of conductive, separable mater-
 ial to the duplicate master, and, third, form-
 ing an electrotype upon said film-covered sur-
 120 face.

4. The method of duplicating metallic sound-
 record matrices, which comprises, first, dupli-
 cating the master-record in metal; second, ap-
 125 plying a film of conductive separable mater-
 ial to the duplicate master; third, forming an elec-
 trotype upon said film-covered surface, and,
 fourth, backing the electrotype or matrix thus
 formed.

5. The method of duplicating sound-record 130

matrices, comprising, first, applying a solution of a conductive separable material to a negative matrix to form a protective film; second, electroplating the film-covered surface to form a positive electrotype; third, applying a solution of conductive separable material to the positive electrotype; fourth, electroplating the latter film-covered surface to form a negative electrotype.

6. The method of duplicating sound-record matrices, comprising, first, applying a solution of a conductive separable material to a negative matrix; second, electroplating the film-covered surface to form a positive electrotype; third, applying a solution of said material to the positive electrotype; fourth, electroplating the latter film-covered surface to form a negative electrotype, and, fifth, backing the latter negative electrotype to form a matrix.

7. The method of obtaining a reverse metallic copy of a metallic record or matrix which comprises, first, coating the record or matrix with a solution of wax, a conductive liquid, and a volatile liquid, and, second, electroplating the film so formed.

8. The method of obtaining a reverse metallic copy of a metallic record or matrix, which comprises, first, coating the record or matrix with a solution of wax, bisulfid of carbon, and a volatile liquid, and, second, electroplating the film-covered surface so prepared.

9. The method of obtaining a reverse metallic copy of a metallic record or matrix, which comprises, first, coating the record or matrix with a solution of wax, bisulfid of carbon and spirits of turpentine, and, second, electroplating the film-covered surface so prepared.

10. The method of obtaining a reverse metallic copy of a metallic record or matrix which comprises, first, coating the record or matrix with a solution of beeswax, bisulfid of carbon, spirits of turpentine, asphaltum and phosphorus, and, second, electroplating the film-covered surface so prepared.

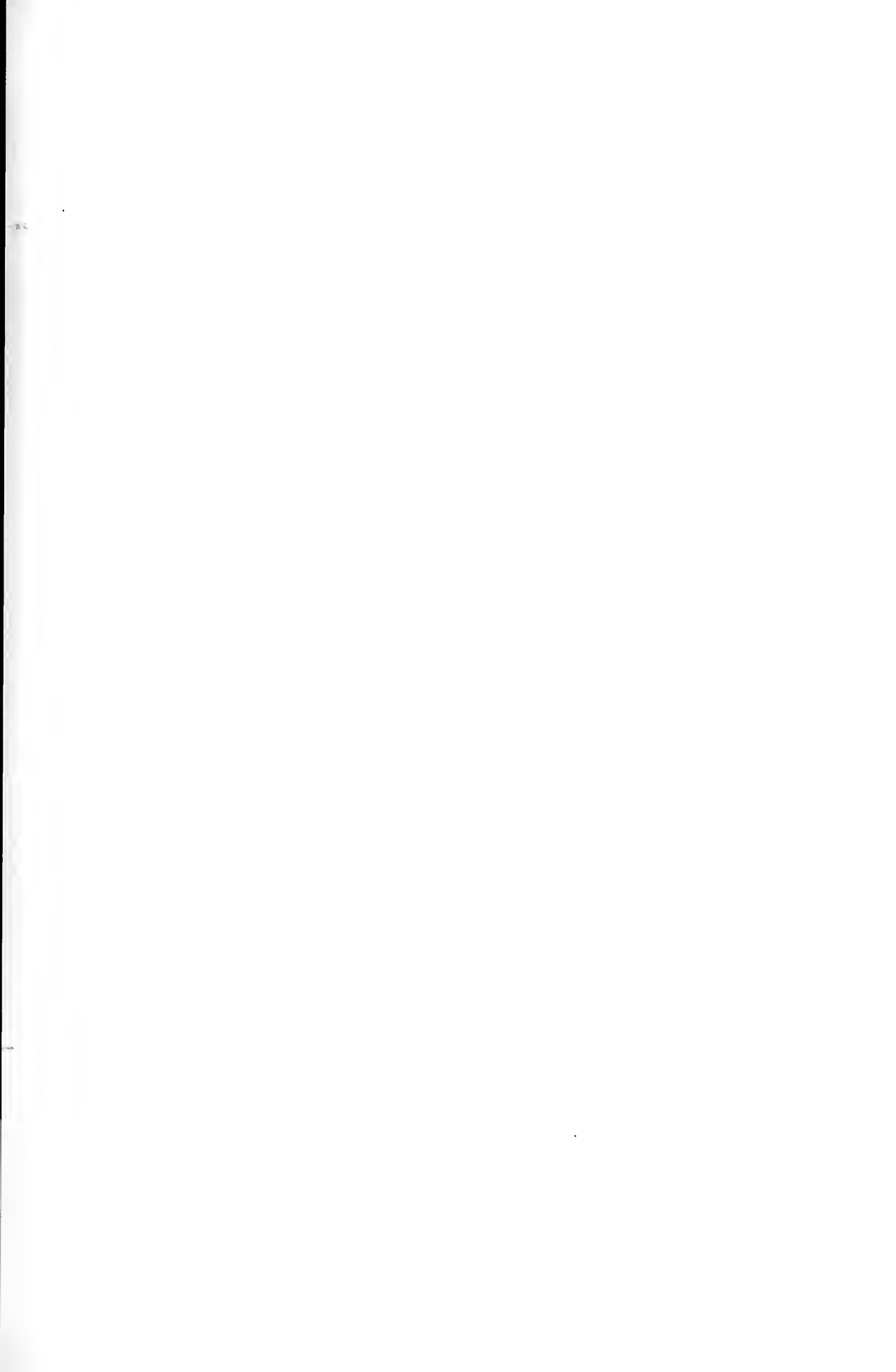
Signed at New York, N. Y., this 4th day of June, 1903.

GEORGE K. CHENEY

Witnesses:

J. E. PEARSON,

W. H. PUMPHREY.



F. L. CAPPS & V. H. EMERSON.
PRODUCTION OF QUASI-ORIGINAL SOUND RECORDS.
APPLICATION FILED OCT. 14, 1902.

Fig.1

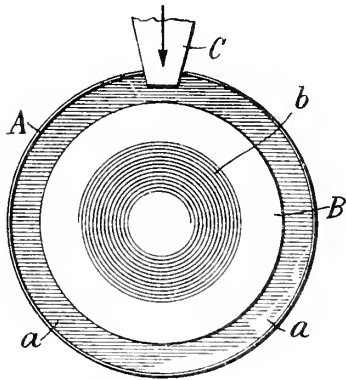


Fig.2

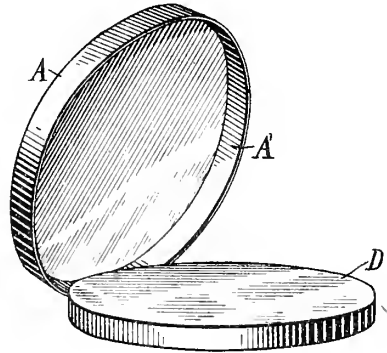


Fig.3

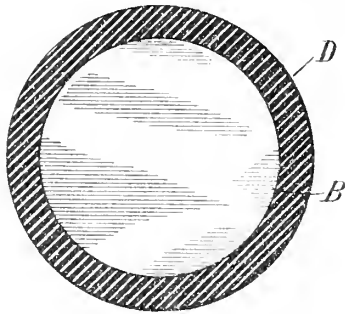
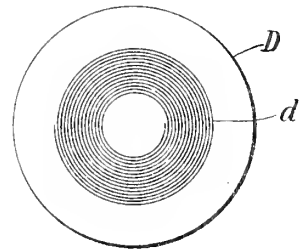


Fig.4



Witnesses:
George Lewis
W. B. Sherman

Frank L. Capps { Inventors
Victor H. Emerson {
by *Thos. H. Moore* Atty

UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, AND VICTOR H. EMERSON, OF NEWARK, NEW JERSEY, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, A CORPORATION OF WEST VIRGINIA.

PRODUCTION OF QUASI-ORIGINAL SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 783,420, dated February 28, 1905.

Application filed October 14, 1902. Serial No. 127,297.

To all whom it may concern:

Be it known that we, FRANK L. CAPPS, of Bridgeport, Connecticut, and VICTOR H. EMERSON, of Newark, New Jersey, have invented a new and useful Production of Quasi-Original Sound-Records, which invention is fully set forth in the following specification.

This invention relates to disk sound-records, particularly those of the type wherein the record-groove is of uniform depth and with lateral undulations corresponding to sound-waves, commonly known as "zigzag" disk sound-records, though it may be applied to other disk records.

The invention consists in procuring from a matrix already obtained from a genuine "original" sound-record "quasi-originals," from which other matrixes may be obtained. The ordinary method of producing disk records is as follows: An original sound-record is made in a tablet of wax-like material by the direct action of the recording-stylus. This original record is then given a graphite coating to render its surface electroconductive. It is next placed in an electroplating-bath and a copper plate is deposited thereon by electrolysis. This copper plate is then separated from the wax-like original record, when it is found to contain a counterpart or reverse of the original record, having an elevated ridge instead of the depressed groove of the original. Finally, this matrix is employed as a stamp or die to impress the record upon the hard disks.

It is sometimes desirable to have more than one matrix of a given selection, so that the work of impressing the hard disk records for the market may go on more rapidly; but considerable expense attends the making of an original sound-record, because the "talent" employed—singers, orchestra, band, &c.—will exact a more or less high price. Besides, the same talent is not always available for making a second original record.

The object of our present invention then is the production of additional matrixes by first producing a quasi-original record from a matrix already on hand.

Our invention will be best understood by describing one particular method of carrying it out and by reference to the accompanying drawings, that illustrate a preferred method.

Figure 1 is a plan showing the matrix in a pan into which the molten material is to be poured. Fig. 2 represents in perspective the hardened cake emptied therefrom. Fig. 3 is a bottom view of the cake with its backing removed to expose the back of the matrix, and Fig. 4 shows the wax-like counterpart of the matrix constituting our quasi-original sound-record.

A is a shallow tin pan some two inches greater in diameter than the matrix-disk and having a rim A' of, say, an inch and a-half in height. The matrix-disk B, preferably heated beforehand, is laid face uppermost in the pan, the lines b representing conventionally the ridges that correspond to the sound-grooves and indicating the matrix-surface. The matrix-disk is placed so as to leave a space a around the edge of the disk B between its edge and the rim A' . Into the pan is then poured the molten material, as from a spout C. This material may be the ordinary composition of the well-known graphophone-(or phonograph) cylinders and will be referred to in general terms as "wax-like" or "wax," though we do not limit ourselves to this particular material. When this melted stuff is poured into the pan, it not only spreads over the matrix-surface b and the space a , but also (owing to the unpolished condition of the bottom or back of the disk B) it penetrates beneath the matrix-disk B, forming a layer or backing about one-eighth of an inch thick, so that the disk B is surrounded by the wax on all sides and becomes completely incased. When the mass in the pan has cooled and become set and hardened, the pan is emptied, showing the cake D. Now if the molten stuff had been poured merely upon the matrix-surface b (and did not surround the disk entirely) it would cool and contract, drawing slightly away from the matrix-surface at places, thereby admitting air between itself and the adjacent matrix-surface, with the result of a bad counterpart. In

fact, no available sound-record at all could be produced by such procedure; but by having the molten stuff completely incase the matrix-disk the technical effect of its cooling and contracting is to bind its mass all the tighter to the matrix-disk and to produce the most intimate contact between the casting and the matrix-surface. Moreover, the casting is attached to the matrix-surface fixedly and will not shrink or draw away from it at all. This idea of completely incasing the matrix-disk on all sides forms the gist of our invention. After the cake D has been thus produced, as above, the backing is stripped away from the bottom of the matrix-disk. The matrix-disk B is then pried off from the wax cake D, and upon the surface of the latter will be found the spiral grooves (conventionally illustrated by the lines *d*) that correspond to the original sound-waves. This cake D, with its spiral grooves *d*, is what we designate our "quasi-original" and is employed in the well-known manner for producing other matrixes.

Of course the precise steps given are merely for the purpose of illustrating one manner of proceeding in order to carry out our invention, and we do not limit ourselves to the same, and our invention is available in connection with disk records containing sound-grooves with vertical undulations as well as those with lateral undulations.

Having thus described our invention, we claim—

1. The process of making sound-records from a matrix by surrounding the said matrix

with molten wax-like material, permitting said material to cool and solidify with the matrix entirely incased in it, peeling off the solidified material from the blank surface of said matrix, and then separating the matrix from the record.

2. The process of making sound-records from a matrix of disk form by surrounding the said matrix with molten wax-like material, permitting said material to cool and solidify with the matrix entirely incased in it, peeling off the solidified material from the blank surface of said matrix, and then separating the matrix from the record.

3. The process of obtaining a reverse impression of the irregularities (constituting sound-records) on the surface of a flat tablet or disk, which consists in heating said disk, then placing the same face uppermost in a shallow pan having a larger area than said disk, next pouring suitable molten material into said pan and around the periphery of said disk and permitting said material to flow underneath as well as over said disk, then allowing the whole to cool, next stripping the back of said disk, and finally separating it from the cast.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.
VICTOR H. EMERSON.

Witnesses:

C. A. L. MASSIE,
WILLIAM E. HILLS.



E. B. FINCH.

SPEED AND TIME REGULATING DEVICE FOR USE UPON SOUND REPRODUCING MACHINES.

APPLICATION FILED MAY 3, 1904.

2 SHEETS—SHEET 1.

FIG. 1.

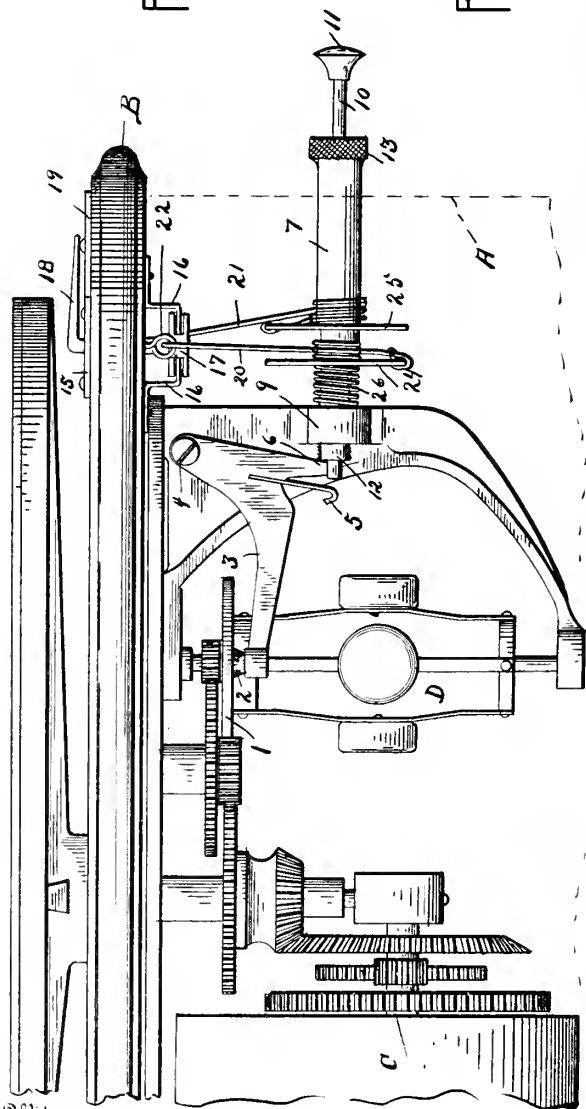


FIG. 2.

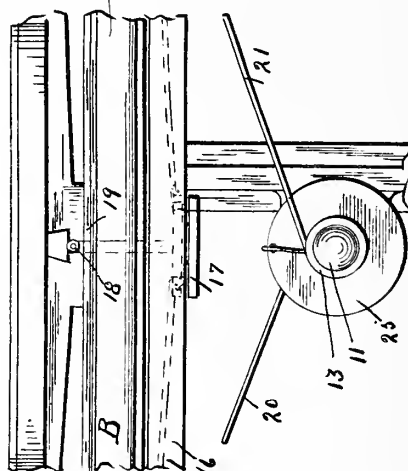
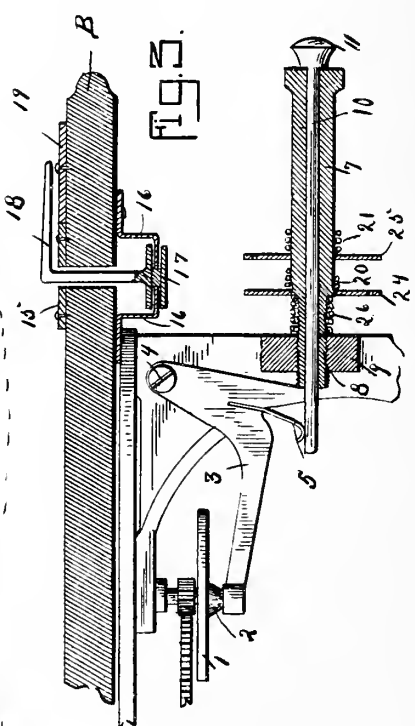


FIG. 3.



Witnesses

S. Mason Mungery

J. Mae Wright,

By

Inventor

Edward Bernard Finch.

David P. Moore,
Attorney



E. B. FINCH.

SPEED AND TIME REGULATING DEVICE FOR USE UPON SOUND REPRODUCING MACHINES.

APPLICATION FILED MAY 3, 1904.

2 SHEETS—SHEET 2.

Fig. 4.

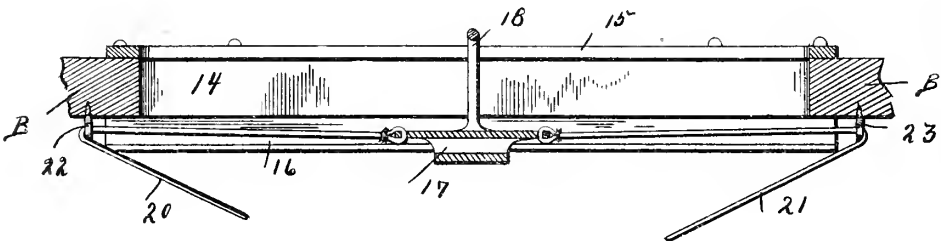


Fig. 5.

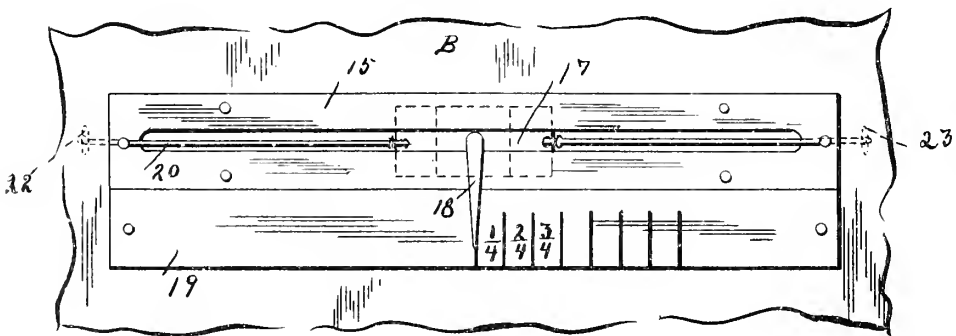
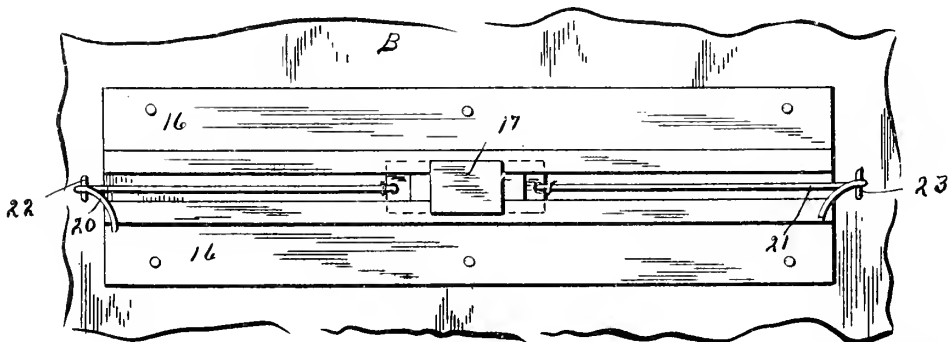


Fig. 6.



Inventor
Edward Bernard Finch

Witnesses

J. Mason Mangham.

J. Mac Wright

334

David P. Moore.

Attorney

UNITED STATES PATENT OFFICE.

EDWARD BERNARD FINCH, OF WASHINGTON, DISTRICT OF COLUMBIA.

SPEED AND TIME REGULATING DEVICE FOR USE UPON SOUND-REPRODUCING MACHINES.

SPECIFICATION forming part of Letters Patent No. 783,512, dated February 28, 1905.

Application filed May 3, 1904. Serial No. 206,167.

To all whom it may concern:

Be it known that I, EDWARD BERNARD FINCH, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Speed and Time Regulating Devices for Use upon Sound-Reproducing Machines, of which the following is a specification.

My present invention relates to improvements in speed and time regulating devices for use upon sound-reproducing machines; and the main object of my invention is the provision of a mechanism whereby sounds can be reproduced from a record in the same rate of speed as the same was recorded thereon, this being accomplished by means of a novel mechanism operably connected with the governing mechanism of the sound-reproducing machine.

It has therefore been my object to produce a simple mechanism which is readily controllable from the outside of the machine and which is provided with an indicator for indicating the rate of speed at which the record should be operated, the said time-setting mechanism being operated before the mechanism is set in operation, so that there is none of the disagreeable sounds or the guesswork of allowing the record to be revolved or rotated, and as the same is being revolved or rotated adjust the governing mechanism, so as to finally secure the proper rate of speed at which the record should be played. All that is absolutely necessary in connection with my mechanism is that when recording the music should be played in the proper tempo in which it is written, the said tempo being stamped upon the record, so that when placed upon a machine upon which my device is used all that is necessary is to operate the indicator so as to point to the proper figures representing the tempo indicated on the record, thus causing the mechanism of the machine to reproduce the music or sounds in the exact tempo in which it is recorded.

In putting my invention into practice I have found it readily applicable to any of the machines now in use, but preferably use it in connection with the disk-machines, the indicating device in this case slightly projecting

through the upper surface of the machine, so as to be observable near the periphery of the disk-support and be always in a position to be readily seen and quickly manipulated so as to indicate the time at which the regulating mechanism is set, the said regulating mechanism being directly operably connected with the indicating mechanism.

To attain these objects, the invention consists of a speed and time regulating and indicating mechanism embodying novel features of construction and combination of parts, substantially as disclosed herein.

In the accompanying drawings, Figure 1 is a side elevation of the operating and governing mechanism and disk sound-reproducing means with my device in operable connection therewith, the starting and stopping pin being in the position it assumes when the machine is in motion. Fig. 2 is an end view of a portion thereof. Fig. 3 is a longitudinal sectional view taken through the starting and stopping mechanism and my speed-regulating mechanism, showing how the indicating mechanism is connected therewith, the starting and stopping pin being in the position it assumes when holding the mechanisms in an immovable position. Fig. 4 is a cross-section through the indicating mechanism's slot or frame. Fig. 5 is a top plan view thereof, and Fig. 6 is a bottom plan view thereof.

Referring to the drawings, A designates the case of a sound-reproducing machine, provided with a hinged top or mechanism support B, which has mounted below the operating mechanism C and the governor mechanism D a vertical shaft E, being connected with both of said mechanisms, whereby the disk-support is properly carried.

The governing mechanism is provided with the brake plate or disk 1, which is adapted to have in contact therewith the brake-shoe 2, carried by the curved arm 3 of the pivoted lever 4, which is provided with a spring-plate 5 and the stop or lug 6. Adapted to control the movement of this lever and regulate its tension, so as to regulate the speed of the governor, and thereby the speed and time of the record, is a rotatable sleeve 7, whose threaded end 8 is mounted in the threaded lug 9 of the

governor - supporting frame, and slidingly mounted within said sleeve and projecting through the casing from the outside is the starting and stopping pin 10, whose reduced end is adapted to pass through the slot in the lower end of the lug or stop and engage the lower end of the spring-plate of the brake, and thereby hold the brake-shoe in contact with the brake-disk of the governor mechanism and lock the mechanism against movement. The spring-plate 5 is of such a strength and length as to project down below the inner reduced end of the stopping and starting pin 10 and when in such position allows the brake-shoe 2 to be released from engagement with the brake plate or disk 1, thus allowing the mechanism to revolve; but as the stopping and starting pin is pushed inward the end of the spring-plate 5 contacts the upper surface of the stopping and starting pin 10 and bears down upon the same, holding the brake-shoe 2 in close contact with the disk 1 and exerting such a tension upon the pin 10 as to hold it stationary in such position, the same forming a lock for the pin 10 and also for the brake-shoe 2 and disk 1. It will therefore be seen that this construction of spring will hold the push-pin 10 securely in place when the pin is in its inmost position or when the governing and operating mechanisms are out of operation or stopped. When it is desired to start the mechanism, it is simply necessary to pull upon the head 11 of the starting and stopping pin, so as to release the same from engagement with the spring-plate, thus reducing the friction between the brake-shoe and brake-disk and allowing the operating mechanism to be set in motion. In order to control the speed more exactly, the rotatable sleeve is revolved so that its inner end 12 will contact the outer face of the stop or lug of the brake, and thereby hold the brake-shoe and brake-disk in frictional contact, so as to allow the speed of the governor to be increased or decreased according to the time at which the record should be reproduced. In order to rotate this sleeve from the exterior of the machine, the milled head or wheel 13 is provided. This much of the invention relates to the speed and time regulating mechanism; but in order that the same may be indicated exteriorly of the machine and the same quickly and properly set I provide through the cover of the machine a longitudinal slot 14, which is covered by means of the slotted plate 15, and upon the bottom of the cover and in alinement with the slot therethrough I provide the two guide-plates 16, in which is adapted to slide the carriage or block 17, to which the indicator 18 is rigidly connected, so that its point, which is exterior of the top, will be adapted to be reciprocated within the slot so as to indicate the various times which are printed or shown upon the scale-indicating plate 19, secured upon the upper face of the cover of the machine.

In order to reciprocate the indicator carriage or block, I provide the two flexible connections 20 and 21, whose ends are connected to the block at opposite sides by being passed through and over the end pulleys 22 and 23. The opposite end of the flexible connection 20 is connected to the inner disk 24 and is adapted to be wound upon the rotatable sleeve between the disks 24 and 25, the said disk 24 acting as an abutment for the spring 26 and in connection with the other disk as a casing for the said flexible connection 20, while the flexible connection 21 is secured to the disk 25 and is adapted to be wound upon the opposite side thereof upon the rotatable sleeve. By this means when the sleeve is rotated to control the friction of the brake-shoe upon the brake plate or disk the indicator is moved in the opposite direction to indicate the time in which the operating mechanism will operate the record as marked on the record. The spring 26 referred to is employed to hold the rotatable sleeve in its adjusted position, so that the movement of the brake thereon will at no time cause the same to be moved, and thereby change the time or speed of the record.

From the foregoing description, taken in connection with the drawings, the operation of my speed and time controlling and indicating mechanism is readily understood; but briefly stated it is as follows: As the time at which the sound or music should be reproduced is printed or affixed upon the record, all that is necessary to do after the record has been placed upon the record-support is to rotate the sleeve 7 so that the pointer controlled thereby will be opposite the proper time-indicating numerals upon the music-scale, which is the same as on the record. This movement will regulate the distance or friction between the brake-disk 1 and brake-shoe 2 so that when the starting or stopping pin 10 is operated to be released from the spring-plate 5 of the brake the governor mechanism is released to the proper degree so as to allow the operating mechanism to rotate the disk, the brake at this point causing enough friction between its shoe and plate to regulate the speed of the rotation or revolution of the record, so that it will be reproduced in the exact time that it was recorded, such time continuing from the outset until the record has been entirely reproduced, thus overcoming the objection to having to start the machine and regulate the speed and time while the same is in motion, as the speed and time with my mechanism is set at the very beginning or before the operating mechanism is set in motion. It will thus be seen that when the spring 5 is in contact with the push-pin 10 the brake disk and shoe are in close proximity, so that the brake-disk is held from revolving, and that when the push-pin 10 is released from the spring the brake-shoe is released from the disk to allow the same to revolve, the rotatable

sleeve at this point abutting against the lug 6 to hold the brake-shoe against the disk to produce the proper friction between the parts, thereby allowing the record to be revolved at the proper rate of speed.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a sound-reproducing mechanism, the combination of an operating mechanism, a governor mechanism, a brake-disk carried thereby, a brake provided with a spring-plate adapted to coact with said disk, a slidably-mounted starting and stopping pin adapted to engage said spring-plate to control the operation of the governor, a rotatable sleeve surrounding the said pin and adapted to control the movement of the brake to regulate the speed of the governor after the mechanism has been set in operation, and an indicating device operably connected with said rotatable sleeve, consisting of a pointer adapted to be oscillated so as to be observable from the outside of the machine, and flexible connections connected to said pointer and rotatable sleeve for operating the pointer simultaneously with the operation of the sleeve.

2. In a sound-reproducing mechanism, the combination of an operating mechanism therefor, a speed-regulating device therefor, and a time and speed indicating mechanism consisting of a horizontally-movable pointer observable from the outside of the machine, and flexible connections between the pointer and speed-regulating device for controlling the movement of the pointer.

3. In a sound-reproducing mechanism, the combination of a casing having a lid with an elongated slot therethrough, an operating mechanism, a speed and time determining mechanism operably connected with said operating mechanism and an indicating mechanism controllable by the speed and time determining mechanism consisting of a pointer projecting through said slot of the lid, and flexible connections connected to said pointer below the lid and speed and time determining mechanism so that the pointer is operated simultaneously with said mechanism.

4. In combination with a sound-reproducing mechanism, of a casing having a slot through the lid thereof, an operating mechanism, means for starting and stopping said mechanism, a speed and time controlling mechanism adapted to operate independently of the stopping and starting mechanism, and an indicating mechanism controlled by the speed and time mechanism consisting of a pointer slidably mounted within the slot and observable from the exterior of the machine, a pair of guides secured upon the under side of the top and below said slot, a block connected with the pointer and slidably mounted with relation to said guides, and means connected to said block and the speed and time regulating or

determining mechanism for simultaneously operating said pointer.

5. In combination with a sound-reproducing mechanism, of a casing having a slot through the lid thereof, an operating mechanism, means for starting and stopping the mechanism, a speed and time controlling mechanism adapted to operate independently of the stopping and starting mechanism, and an indicating mechanism controlled by the speed and time mechanism, consisting of a pointer slidably mounted within the slot and observable from the exterior of the casing, a pair of guides secured upon the under side of the top and below said slot, a block connected with the pointer and slidably mounted with relation to said guides and flexible connections connected to said block and to the speed and time determining mechanism.

6. In a sound-reproducing machine, the combination of an operating mechanism, a governor mechanism, a pivoted lever carrying a brake, a spring-plate and a stop; a slidably-mounted stopping and starting pin adapted to engage said spring-plate to control the lever, a rotatable sleeve surrounding the pin adapted to have its end engage the stop to regulate the friction between the brake and the governor mechanism to control the speed thereof, an indicator, and flexible connections operably connected with said indicator and the sleeve for controlling the movement of the indicator and the sleeve.

7. In a sound-reproducing machine, the combination of an operating mechanism, a governor mechanism, a pivoted lever carrying a brake, a spring-plate and a stop; a slidably-mounted stopping and starting pin adapted to engage said spring-plate to control the lever, a rotatable sleeve surrounding the pin adapted to have its end engage the stop to regulate the friction between the brake and the governor mechanism to control the speed thereof, a pair of disks mounted on said sleeve, an indicator, and means for controlling the movement of the indicator connected to the disks of the sleeve.

8. In a sound-reproducing machine, the combination of an operating mechanism, a governor mechanism, a pivoted lever carrying a brake, a spring, and a stop; a slidably-mounted stopping and starting pin adapted to engage said spring-plate to control the lever, a rotatable sleeve surrounding the pin, a pair of disks carried by the sleeve, an indicator, and a flexible connection connected to each disk and to the opposite sides of the indicator for controlling the movement of the indicator.

9. In combination with a sound-reproducing machine having a casing with a slot through the lid thereof and with an operating, stopping and starting, governor, and speed-controlling mechanisms, of a time and speed indicating mechanism therefor, comprising a

scale located exteriorly of the casing to one side of the slot, a pointer adapted to slide longitudinally in said slot, a block connected to said pointer, flexible connections connected to said block, and disks operably connected to said speed-controlling mechanism and to the opposite ends of the flexible connections for controlling the pointer.

10 10. In combination with a sound-reproducing machine having a casing with a slot through the lid thereof and with an operating, stopping and starting, governor and speed-controlling mechanisms, of a time and speed indicating mechanism therefor, comprising a

scale located exteriorly of the casing and to one side of the slot, a pointer adapted to slide longitudinally in said slot, a block connected to said pointer, flexible connections connected to said block, and means operably connected to said speed-controlling mechanism and to the opposite ends of the flexible connections for controlling the pointer. 15 20

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD BERNARD FINCH.

Witnesses:

T. BLAIR SHOEMAKER,
PHILIP S. McLEAN.



D. HIGHAM.
PHONIC APPARATUS.
APPLICATION FILED DEC. 12, 1904.

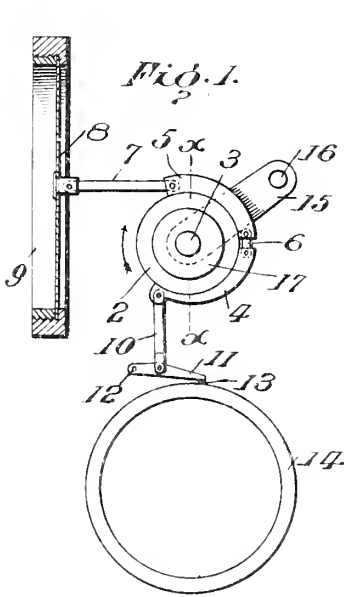


Fig. 1.

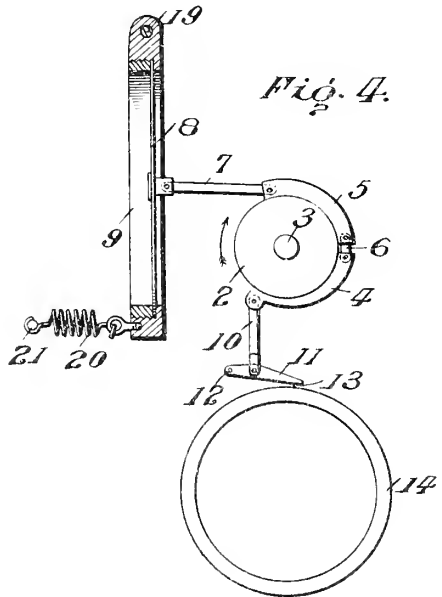


Fig. 4.

Fig. 2.

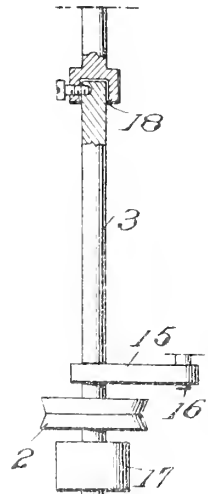


Fig. 5.

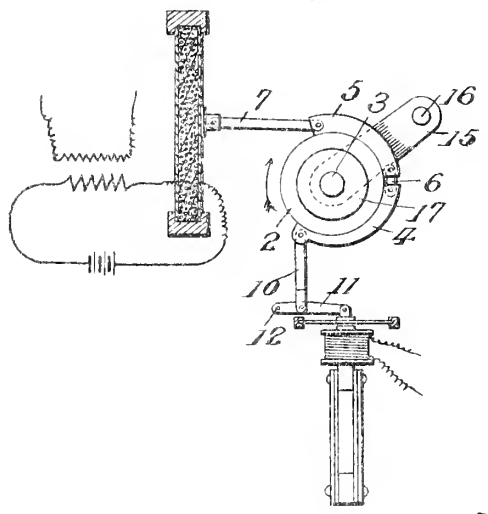


Fig. 3.

Witnesses

Wm. B. Ketcham,
Gustave R. Thompson.

Inventor

Daniel Higham,

By

Mauro, Cameron, Lewis & Massie,

Attorney J.

UNITED STATES PATENT OFFICE.

DANIEL HIGHAM, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO HIGHAM-OPHONE COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 783,750, dated February 28, 1905.

Application filed December 12, 1904. Serial No. 236,609.

To all whom it may concern:

Be it known that I, DANIEL HIGHAM, of Bridgeport, Connecticut, have invented a new and useful Improvement in Phonic Apparatus, which invention is fully set forth in the following specification.

This invention relates to phonic apparatus employing friction means for reproducing sound vibrations with increased energy, as described in my United States patent dated July 16, 1901, No. 678,566. In such employment of friction means it has been found difficult to construct and adjust the same in such manner as to exert and maintain the desired amount of frictional force.

It is the object of the present invention to provide means whereby the friction means will automatically adjust the amount of pressure determining the frictional contact, and thereby maintain the frictional force exerted at a practically uniform amount.

The invention can best be described in connection with the accompanying drawings, in which—

Figure 1 diagrammatically represents said invention as applied to graphophonic reproducing means. Fig. 2 is a plan view of part of the apparatus shown in Fig. 1. Fig. 3 is a view in cross-section of the friction roller and shoe. Fig. 4 is a diagram illustrating another mode of carrying out the invention, and Fig. 5 represents the invention as applied to telephonic reproducing means.

In Fig. 1, 2 is a friction-roller supported by a spindle 3 and revolved in the direction of the arrow from a suitable source of motive power. 4 and 5 represent, respectively, the two parts of a friction-shoe connected together in the present instance by a small link 6. The shoe extends more than half-way around roller 2. 7 is a link connecting the part 5 to a diaphragm 8, the latter being supported by a frame 9, (shown in cross-section.) 10 is a link connecting shoe part 4 to a lever 11, hinged in the present instance at 12 and carrying a reproducing-point 13 in contact with a sound-record 14, revolved and advanced by usual

means. 15 is a swinging bearing for spindle 3, hinged upon a pin 16, and 17 is a weight to lend retarding inertia to spindle 3 and to cause the friction-roller 2 to press by gravity upon the shoe 4, 5.

In Fig. 2 roller 2, spindle 3, weight 17, swinging bearing 15, and pin 16 are shown together with a coupling-socket for spindle 3, (shown in cross-section at 18,) which permits of movement of swinging bearing 15.

In Fig. 3 roller 2 and shoe parts 4 and 5 are shown in cross-section through the line *x x*, Fig. 1, from which it will be seen that roller 2 is slightly grooved or V-shaped to guide the shoe parts 4 and 5 and that shoe part 5 is much wider than shoe part 4.

In Fig. 4 similar reference-numerals indicate similar parts shown in Figs. 1, 2, and 3; but in this modification of the invention the roller 2 is revolved by spindle 3 about a fixed point or axis, while the frame 9, supporting diaphragm 8, in the present instance is made to swing upon a pin 19, and a spring 20, connecting frame 9 to a pin 21, is used to support frame 9 movably against the frictional force exerted by roller 2.

In Fig. 5 similar parts shown in Figs. 1, 2, and 3 are also indicated by similar reference-numerals; but in this application of the invention a telephone-receiver is diagrammatically represented as means for operating lever 11, and a telephone-transmitter is diagrammatically represented as means for responding to the reproduced sound-vibrations.

The operation of the friction means independently of my present invention is briefly as follows: Sonorous vibrations which are imparted to lever 11 by suitable primary vibrating means will produce through link 10 corresponding vibrations or variations in the amount of pressure exerted by shoe parts 4 and 5 upon roller 2, and thereby effect corresponding vibrations or variations in the frictional force exerted through link 7 upon suitable secondary vibrating means, substantially as described in my above-mentioned patent of July 16, 1901. To effect automatic adjust

ment of the friction means, which is the object of the present invention. I have shown means for permitting movement to take place between the friction means and the secondary vibrating means in accordance with the amount of frictional force exerted between the same. In Fig. 1 this movement is permitted to take place by means of the swinging bearing 15 supporting spindle 3 and linged at 16, while in Fig. 4 it is permitted to take place by means of the swinging frame 9, hinged at 19 and elastically supported by the spring 20.

The operation of my present invention will be readily understood, for it will be seen that the frictional force exerted by the rotation of the roller 2 upon diaphragm 8 or other suitable secondary vibrating means could not vary unduly, inasmuch as an increase of frictional force would tend to move shoe parts 4 and 5 farther around the roller 2 in the direction of rotation by virtue of the permitted movement between the roller 2 and diaphragm 8, Figs. 1 and 4, whereby the pressure imparted through link 10 in supporting shoe parts 4 and 5 in frictional contact with roller 2 would be reduced, thereby checking or counterbalancing the increased frictional force, and vice versa. The automatic adjustment of the friction means is thus effected. It will further be understood that the inertia of the parts, which are made movable in order to effect this automatic adjustment, will be sufficiently great to prevent interference with the vibrations in frictional force corresponding to sound-waves.

The advantage of having shoe part 5 wider than shoe part 4, as shown in Fig. 3, is most noticeable with the use of a friction-roller, composed of amber or other similar material. When the pressure of shoe part 4 is increased by the means herein provided for automatic adjustment of the friction means, the shoe part 4 will tend to wear the friction-roller away in the middle of the groove and tend to leave only the outer edges of the groove for the shoe part 5, whereby the pressure of shoe part 5 will be increased in proportion to the area of frictional surface, and, vice versa, a decreased pressure of shoe part 4 will effect a decreased pressure per amount of frictional surface of shoe part 5, thus making the automatic adjustment of friction means most efficient.

It should be understood that the present invention may be applied to any kind of phonic apparatus employing a friction means and that modifications of the precise arrangement of parts herein diagrammatically represented may be made without departing from the spirit and scope of the invention.

In the claims which follow the friction-roller and shoe parts will be referred to as "friction means," the vibrating means setting up sound-vibrations at the friction means as

"primary vibrating means," the vibrating means responding to sound-vibrations set up by the friction means as "secondary vibrating means," the part of the friction-shoe farthest in the direction of rotation of friction-roller as the "forward part of the friction-shoe," and the receding part as "the rear part of the friction-shoe."

What is claimed is—

1. In a phonic apparatus, a primary and a secondary vibrating means, and a friction means, in combination with means for permitting movement between the said friction means and said secondary means.

2. In a phonic apparatus, the combination of a secondary vibrating means, a friction device, means permitting one of said parts to move toward and away from the other part as the frictional force increases or diminishes, and a primary vibrating means.

3. In phonic apparatus, a primary and a secondary vibrating means, and a friction means, in combination with means permitting movement of said friction means in response to the frictional force exerted, said movement being sufficient to effect automatic adjustment of the friction means, substantially as described.

4. In a phonic apparatus, the combination of primary and secondary vibrating means and intermediate friction means, with means permitting movement of said friction means toward and away from said secondary vibrating means as the frictional force increases or diminishes.

5. In a phonic apparatus, the combination of primary and secondary vibrating means, and intermediate friction means, one member of which rests by gravity upon the other and is supported to have freedom of movement toward and from the secondary vibrating means.

6. In a phonic apparatus, the combination of primary and secondary vibrating means, and intermediate friction means comprising a friction-roller carried by a shaft which rests by gravity upon a friction-shoe constituting the other member.

7. In a phonic apparatus, a friction means including a friction-shoe whereof one part has greater frictional surface than the other part thereof for the purpose described.

8. In a phonic apparatus, a friction means including a friction-shoe whereof the rear part has a greater area of frictional surface than the forward part thereof.

9. In a phonic apparatus, a friction means including a friction-roller and a shoe extending more than half-way around said roller, and composed of two parts hinged together.

10. In phonic apparatus, the combination of a primary and a secondary vibrating means, an intermediate friction device, and means permitting relative movement between one

of said vibrating means and said friction device.

5 11. In a phonic apparatus, the combination of a primary and a secondary vibrating means, and an automatically-adjustable friction device, the adjustment of said device being effected in response to and being proportional to the friction exerted.

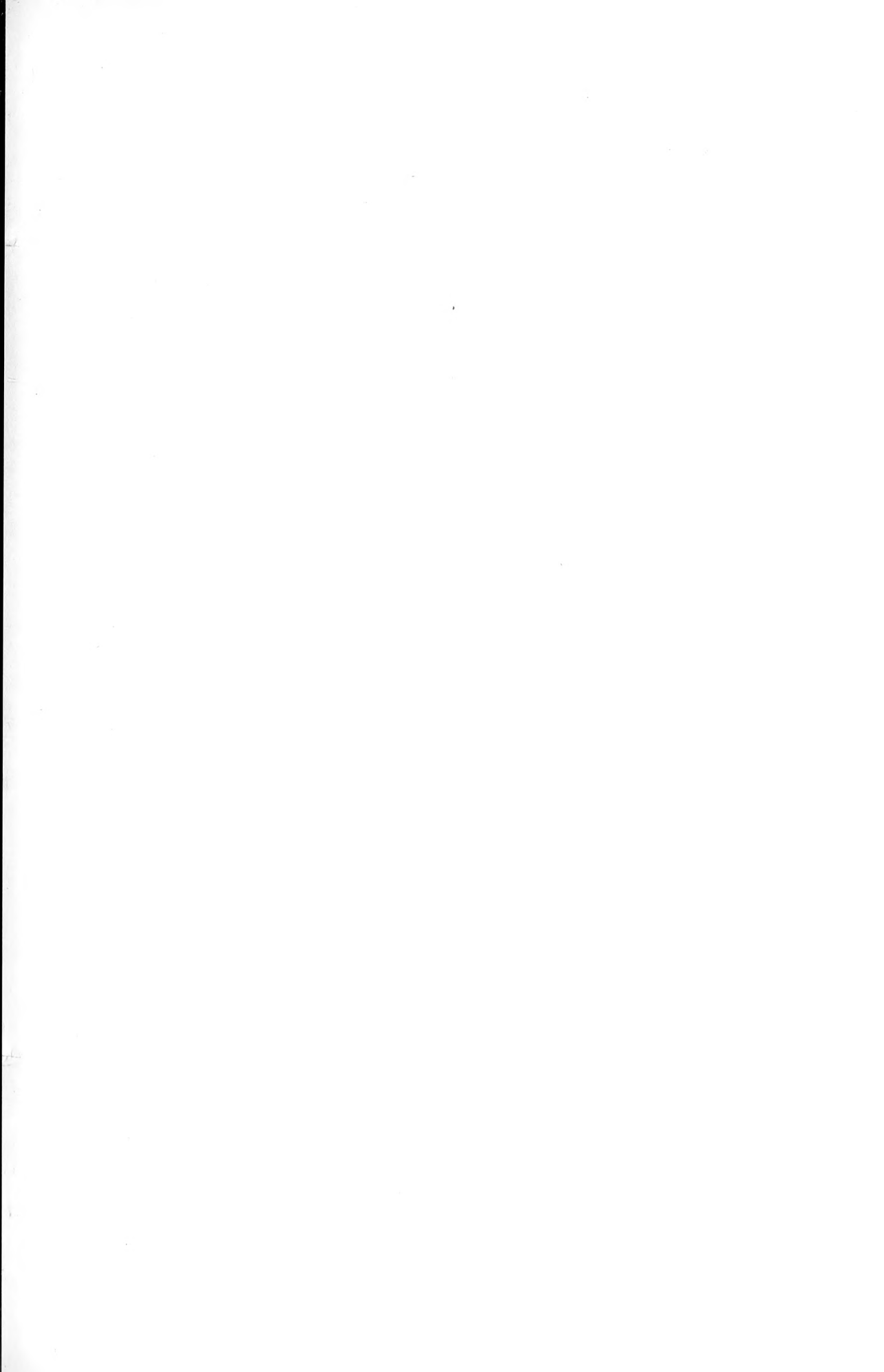
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

DANIEL HIGHAM.

Witnesses:

A. B. KEOUGH,
C. A. GIBNER.





No. 783,934.

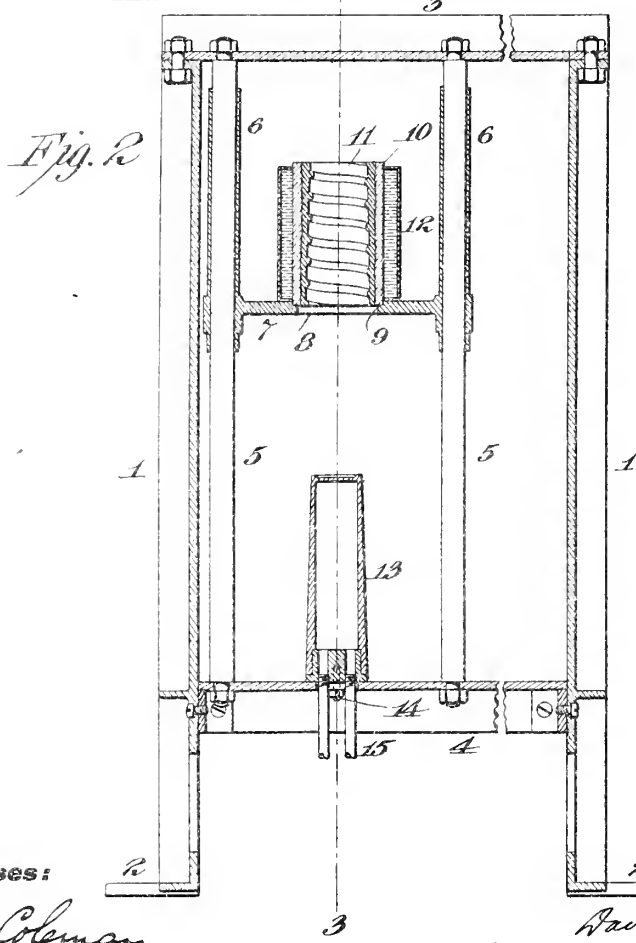
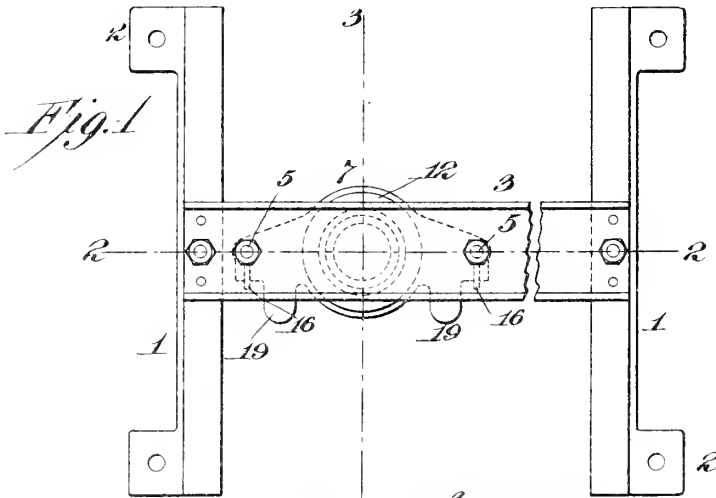
PATENTED FEB. 28, 1905.

D. A. DODD.

MACHINE FOR EXTRACTING DUPLICATE PHONOGRAPH RECORDS.

APPLICATION FILED FEB. 28, 1903.

2 SHEETS—SHEET 1.



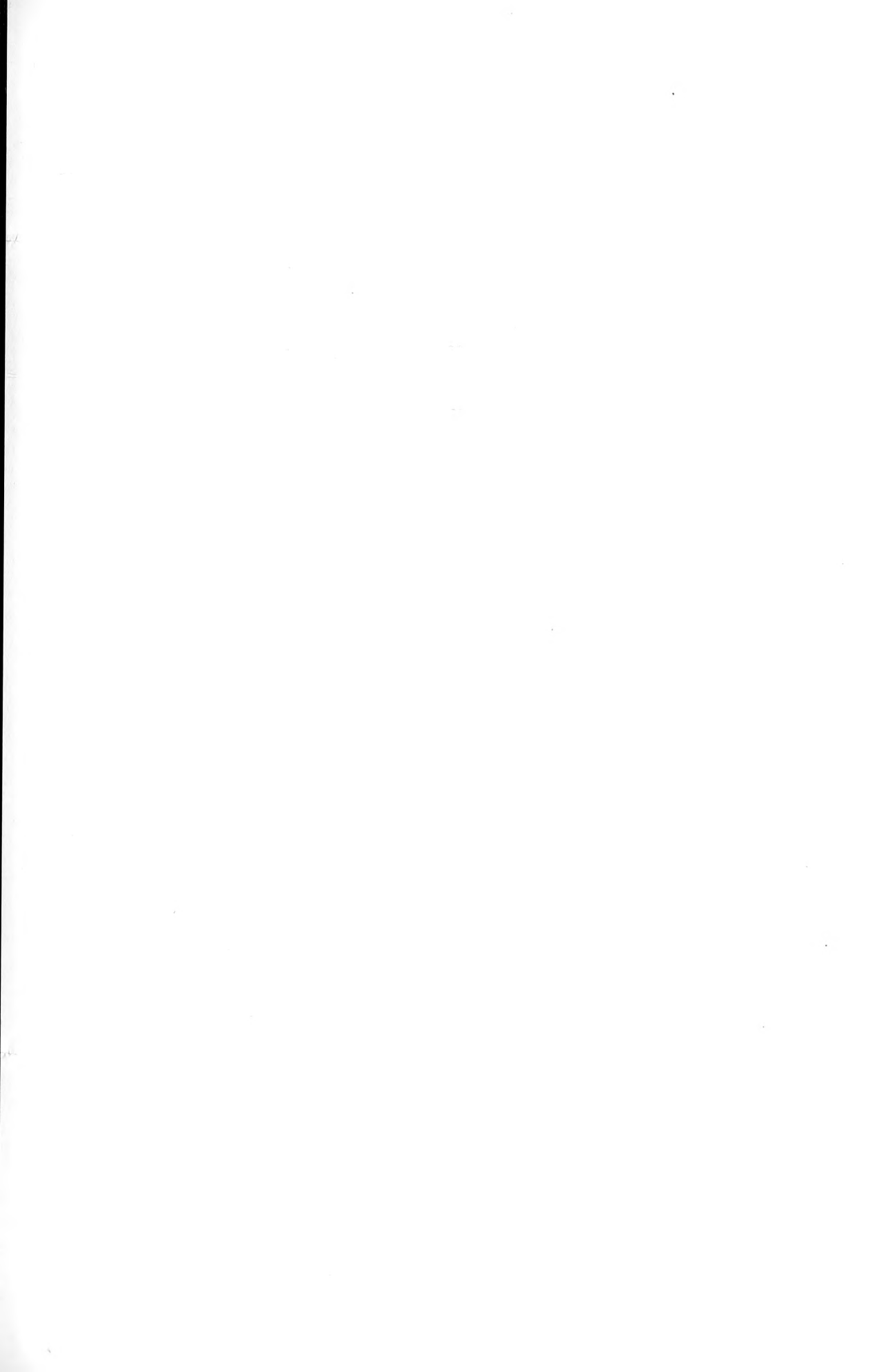
Witnesses:

Jas. F. Coleman
Geo. Robt Taylor

Inventor

David A. Dodd
by Algeo & Algeo

Attorneys



No. 783,934.

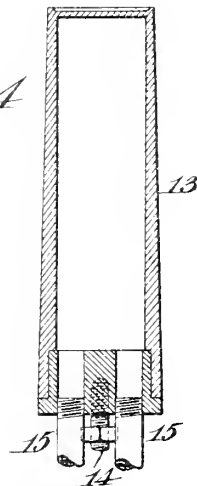
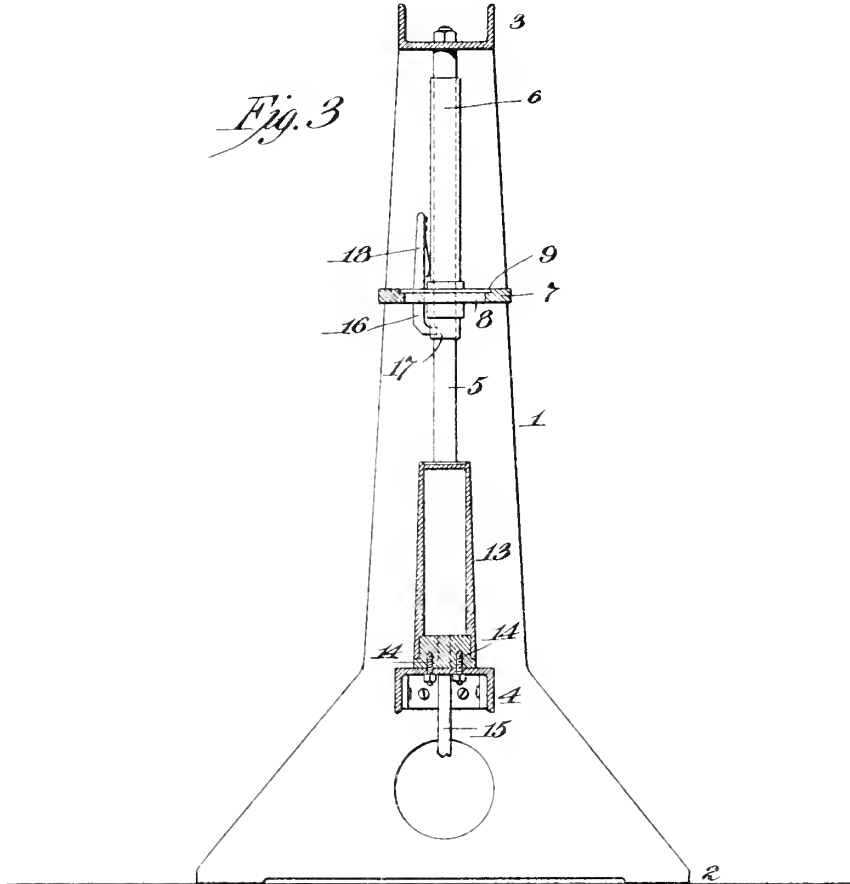
PATENTED FEB. 28, 1905.

D. A. DODD.

MACHINE FOR EXTRACTING DUPLICATE PHONOGRAPH RECORDS.

APPLICATION FILED FEB. 28, 1903.

2 SHEETS—SHEET 2.



Witnesses:

Jas. F. Coleman
Jno. Robt Taylor

Inventor

David A. Dodd
by *Agnes H. ...*
Attorneys

UNITED STATES PATENT OFFICE.

DAVID A. DODD, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR EXTRACTING DUPLICATE PHONOGRAPH-RECORDS.

SPECIFICATION forming part of Letters Patent No. 783,934, dated February 28, 1905.

Application filed February 26, 1903. Serial No. 145,204.

To all whom it may concern:

Be it known that I, DAVID A. DODD, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Machines for Extracting Duplicate Phonograph-Records, of which the following is a specification.

In the production of duplicate phonograph-records from molds by suitable casting or allied processes the removal of a finished duplicate from the mold is an operation which requires some delicacy of manipulation, owing to the fragile nature of the wax-like material and to the extremely minute character of the record-surfaces. It is therefore desirable that after the duplicate record has contracted sufficiently to clear the mold the separation of the two should be effected so as to not scratch the record in its withdrawal. It is also desirable in this art to effect a relatively rapid but uniform cooling of the duplicate record in order that it may not be warped or cracked.

My present invention presents a machine for extracting duplicate records from molds in a simple and expeditious manner; and my object is to provide a machine for the purpose by which duplicate records may be removed from the molds in which they are produced without scratching or injuring the record-surface in any way and by which in addition a relatively rapid but uniform cooling of the record can be effected.

To this end the invention consists, broadly, in providing an artificially-cooled mandrel or extractor over which the record within the mold is introduced, by which it is held, and in combining therewith suitable appliances for effecting a relative longitudinal separation of the record and mold after the record has contracted sufficiently to enable it to be extracted from the mold.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, in which

Figure 1 is a plan view of my improved apparatus; Fig. 2, a longitudinal sectional view

on the line 2 2 of Fig. 1; Fig. 3, a vertical sectional view on the line 3 3 of Fig. 2, and Fig. 4 a sectional view of the mandrel or extractor on an enlarged scale.

In all of the above views corresponding parts are represented by the same numerals of reference.

The device comprises two side frames 1 1, having feet 2 secured to a suitable base or foundation, a top member 3, and an intermediate mandrel-supporting member 4. The members 3 and 4 are made, preferably, of channel-irons, as shown, secured in position in any suitable way. These horizontal members 3 and 4 of the apparatus are preferably made sufficiently long to accommodate a series of the record-extracting devices; but I show them broken away and illustrate only one of the core-extracting devices. Extending between the horizontal members 3 and 4 of the frame are vertical guides 5 5, on which work sleeves 6 6. Extending between these sleeves is a platform 7, having a central opening 8 and formed with a shoulder 9 for receiving the mold 10, from which the record 11 is to be removed. The opening 8 in the platform is large enough to permit the record to pass through the same.

Ordinarily I insert the mold 10, carrying the record therein, within a hollow jacket 12, filled with cold water, so as to cool the mold and facilitate the shrinking of the record as well as to chill the record-surfaces thereof. The mold 10 and jacket 12 are slightly tapered and are engaged frictionally. Carried by the horizontal member 4 of the frame is a hollow mandrel or extractor 13, secured in place by screws 14 and having pipes 15 leading into the same and through which cold water circulates, so that the core will be always kept artificially cool.

In order to lock the platform 7 in a normally elevated position, I provide a latch 16 on one or both of the sleeves 6. This latch engages a notch 17 in the vertical guide 5 and is impelled into this engagement by a spring 18, engaging under the tail thereof. Ordinarily the platform 7 is provided with lugs

19, constituting finger-pieces by which it may be elevated.

In operation 1 proceed as follows: The platform 7 is elevated and locked by the latch or latches 16 in this position. A mold carrying a duplicate record therein is now preferably inclosed in the water-jacket 12 and inserted in position within the shoulder 9 of the platform 7. The use of the water-jacket 12 facilitates the chilling of the material. The latch or latches 16 are now released, permitting the platform to descend, whereby the extractor will enter the mold and will tend to chill the record therein. As soon as the record has contracted sufficiently to clear the mold this fact can be determined by pressing lightly upon the record and perceiving a slight play between the same and the mold. When this relative separation of the record and mold has taken place, so that the record-surface will entirely clear the mold, the platform 7 is again elevated, drawing the mold clear of the record and leaving the latter on the extractor 13. The record is now removed from the extractor and placed upon a suitable tapered support until it reaches the normal temperature. By effecting this further cooling of the record when in engagement with a tapered support, as explained, the record does not become warped or lose its shape. The mold is now removed from the platform 7, and the explained operations are repeated. It will be understood in practice that five or six of the extracting mechanisms are arranged in the same framework under the attention of a single operator, so that by the time the platform of the sixth extracting mechanism, for example, is dropped in place the record in the first mold will have contracted sufficiently to be withdrawn. In this way the entire time of the operator can be occupied in the use of the apparatus.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In an apparatus for extracting phonograph-records from molds, a mold or matrix adapted to contain a hollow record, a tapering extractor adapted to engage the bore of said record and means for cooling said extractor, whereby the record is contracted so as to bind on the extractor and clear the mold, substantially as described.

2. In an apparatus for extracting phonograph-records from molds, a mold or matrix adapted to contain a hollow record, a tapering extractor, and mechanism for producing relative longitudinal movement of said mold and extractor, whereby the extractor enters the

bore of the record, engages it and withdraws it from the mold, substantially as described.

3. In an apparatus for extracting phonograph-records from molds, in combination, a hollow mold or matrix, an extractor, and means for cooling said extractor, said extractor and mold being carried on supports which are movable with respect to each other, substantially as set forth.

4. Extracting mechanisms for the purposes described, comprising in combination, an artificially-cooled extractor over which is engaged a phonograph-record within a mold, and means for effecting a relative longitudinal separation of the mold and record, substantially as set forth.

5. Extracting apparatus for the purpose described, comprising in combination, an artificially-cooled extractor, and a platform having an opening therein, movable longitudinally with respect to the extractor, substantially as set forth.

6. Extracting apparatus for the purpose described, comprising in combination, an artificially-cooled extractor, a platform having an opening therein, movable vertically longitudinally with respect to the extractor, and means for locking the platform in position above the extractor, substantially as set forth.

7. Extracting apparatus for the purpose described, comprising in combination, an artificially-cooled extractor, a pair of guide-rods arranged diametrically with respect to the extractor, and a platform having an opening therein, movable on said guide-rods longitudinally with respect to the extractor, substantially as set forth.

8. Extracting apparatus for the purpose described, comprising in combination, an artificially-cooled extractor, a pair of guide-rods arranged diametrically with respect to the extractor, a platform having an opening therein, movable on said guide-rods and longitudinal with respect to the extractor, and means for locking the platform normally above the extractor, substantially as set forth.

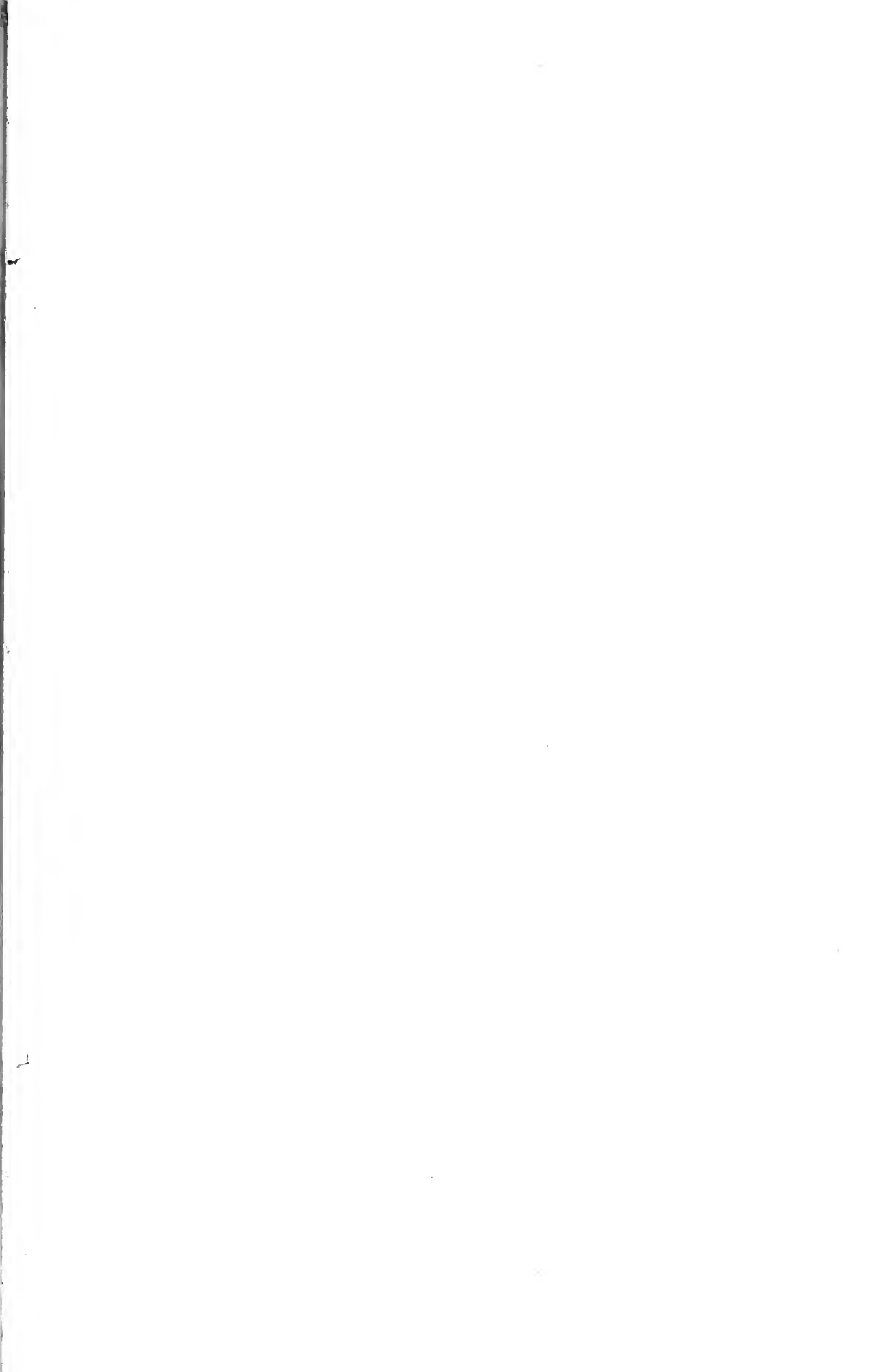
9. Extracting apparatus for the purpose described, comprising in combination, a hollow extractor, means for circulating cooling-water therein, and a platform having an opening and longitudinally movable with respect to the extractor, substantially as set forth.

This specification signed and witnessed this 24th day of February, 1903.

DAVID A. DODD.

Witnesses:

J. F. RANDOLPH,
JNO. ROBT. TAYLOR.



A. R. CUNNIUS.
TRUMPET FOR TALKING MACHINES.
APPLICATION FILED OCT. 11, 1904.

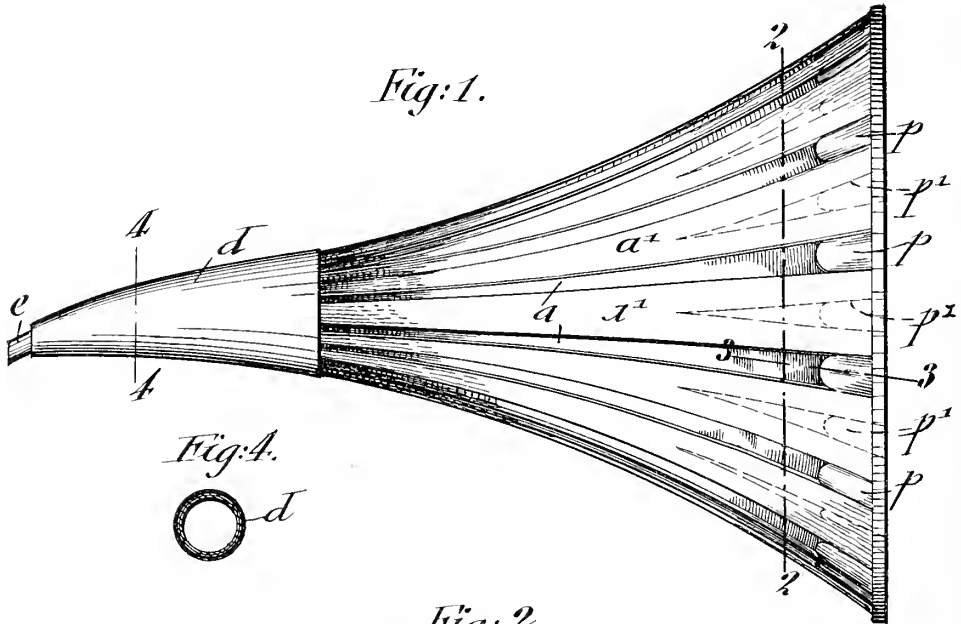


Fig:1.

Fig:4.



Fig:2.

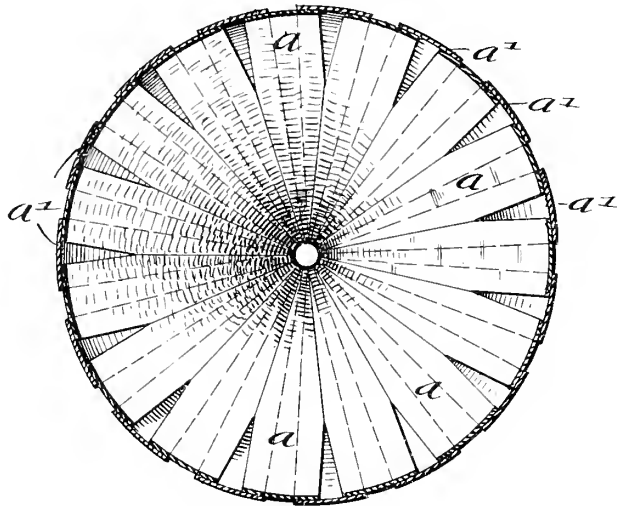


Fig:3.



Witnesses
Henry J. Suber
H. C. Schell

Inventor
Alfred R. Cunnius
 By his Attorney *Yuma Nib*

UNITED STATES PATENT OFFICE.

ALFRED R. CUNNIUS, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO LIPMAN KAISER, OF NEW YORK, N. Y.

TRUMPET FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 784,385, dated March 7, 1905.

Application filed October 11, 1904. Serial No. 227,992.

To all whom it may concern:

Be it known that I, ALFRED R. CUNNIUS, a citizen of the United States, residing in New York, borough of Brooklyn, in the State of New York, have invented certain new and useful Improvements in Trumpets for Talking-Machines, of which the following is a specification.

This invention relates to an improved trumpet for talking-machines of all kinds which combines lightness with strength and resistance against injury by being dropped or from other causes, always preserving its original shape and appearance; and the invention consists of a trumpet for talking-machines comprising a conically-tapering body composed of a number of layers, the outer layer being composed of tapering strips separated by spaces tapering inwardly from the larger end of said body, a reinforcing-rim surrounding the body at said larger end, and filling-pieces retained by said rim and extending inwardly into said tapering spaces.

The invention also consists in further novel features and combinations of parts, which will be hereinafter described and claimed.

In the accompanying drawings, illustrative of one embodiment of the invention, Figure 1 is a side elevation of my improved trumpet for talking-machines. Fig. 2 is a vertical transverse section of the same on line 2 2, Fig. 1. Fig. 3 is a detail section on line 3 3, Fig. 2, through the mouth of the trumpet, drawn on a larger scale; and Fig. 4 is a vertical transverse section on line 4 4, Fig. 1.

Similar letters of reference indicate corresponding parts.

My improved trumpet is made of conical shape and of thin strips, preferably of wood, which taper from the mouth to the inner small end. The body of the trumpet is made of two superposed layers of tapering strips $a a'$, the strips a of the inner layer breaking joints with the strips a' of the outer layer, as shown clearly in Fig. 2. The tapering strips are diminished in width toward the smaller end of the trumpet, some of them being terminated at some distance from the same, while

others run through, so as to form a small tubular end c . The small end of the trumpet is surrounded by a layer d of waterproof material—such as Japan cloth, hard rubber, or other suitable material—which serves as a handle for the trumpet and also for reinforcing the ends of the tapering strips at the small end of the trumpet. The outer end or mouth of the trumpet is reinforced by an exterior rim e of wood or other suitable material, and the spaces between the exterior strips adjacent the rim are ornamented by short rounded-off strips or filling-pieces p , that impart a conical edge to said strips, and thereby an ornamental appearance to the outer wider end or mouth of the trumpet. Filling-pieces p' are also interposed between the strips of the inner layer in the same manner, as shown in dotted lines in Fig. 1. The rim e holds the short filling-pieces $p p'$ and the layers of tapering strips $a a'$ in position and imparts strength and finish to the mouth of the trumpet. The filling-pieces form a uniform continuous support for the reinforcing-rim e , serving thereby, in addition to the rim, for strengthening the outer end or mouth of the trumpet.

As the trumpet is preferably made throughout of wood, it acts in the nature of a sounding-board and transmits the sounds spoken into the same in a better manner than the hard-rubber or other trumpets used heretofore for talking-machines and the like. Besides, the trumpet is more durable, as it can be dropped without injury or denting of the same, and it is also cheaper than the usual trumpets of brass and similar material.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A trumpet for talking-machines, comprising a conically-tapering body composed of a number of layers, the outer layer being composed of tapering strips separated by spaces tapering inwardly from the larger end of said body, a reinforcing-rim surrounding the body at said larger end, and filling-pieces retained by said rim and extending inwardly into said tapering spaces.

2. A trumpet for talking-machines, com-

prising a conically-tapering body made of
layers of tapering strips, the strips of each
layer being separated by spaces tapering in-
wardly from the larger end of the body and
5 breaking joints with the strips of the adjacent
layer, an outer reinforcing-rim surrounding
the body at the larger end thereof, filling-
pieces retained by said rim and extending in-
wardly into the tapering spaces of the outer

layer, and similar filling-pieces inserted in the 10
spaces between the strips of the inner layer.

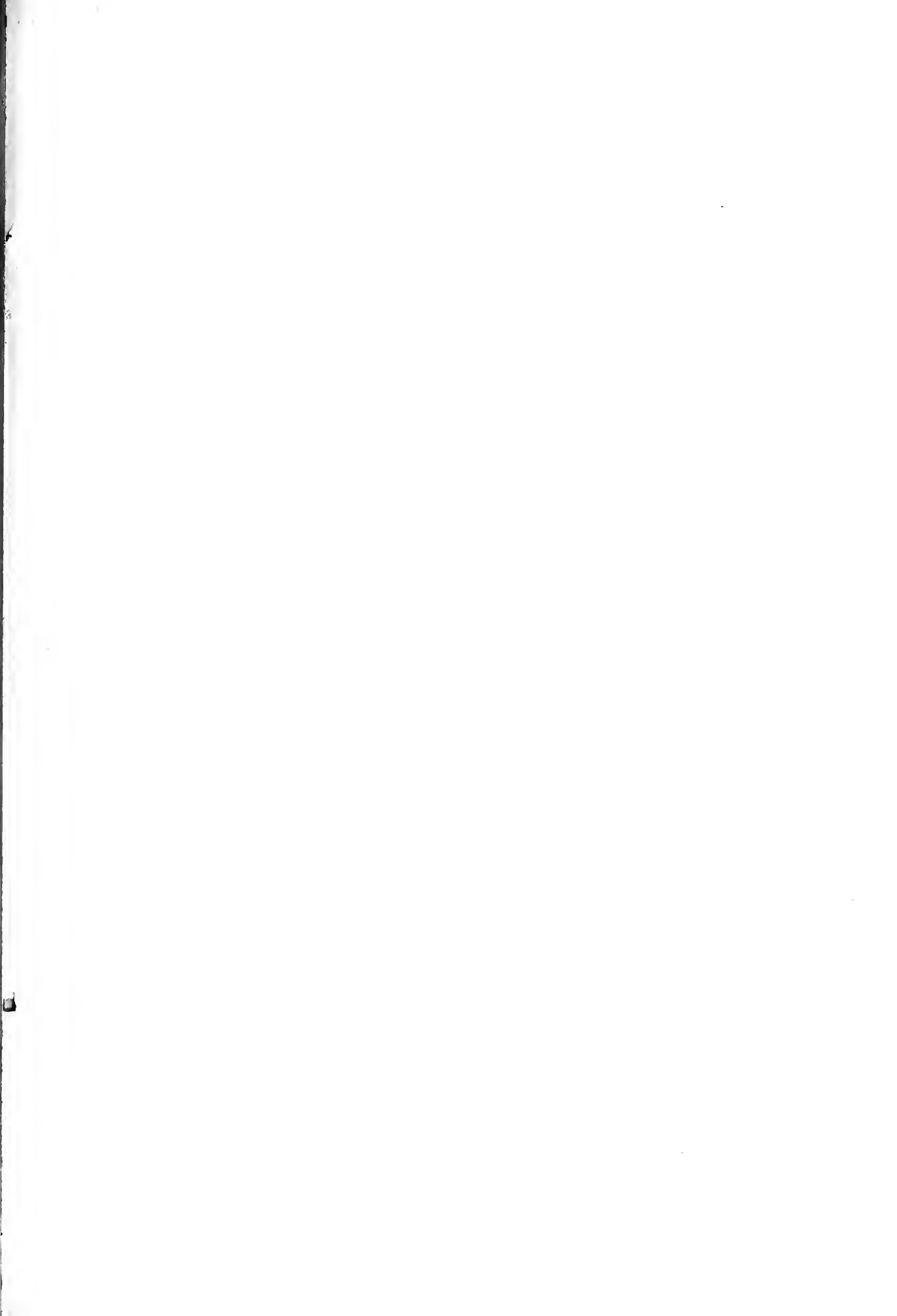
In testimony that I claim the foregoing as
my invention I have signed my name in pres-
ence of two subscribing witnesses.

ALFRED R. CUNNIUS.

Witnesses:

PAUL GOEPEL,

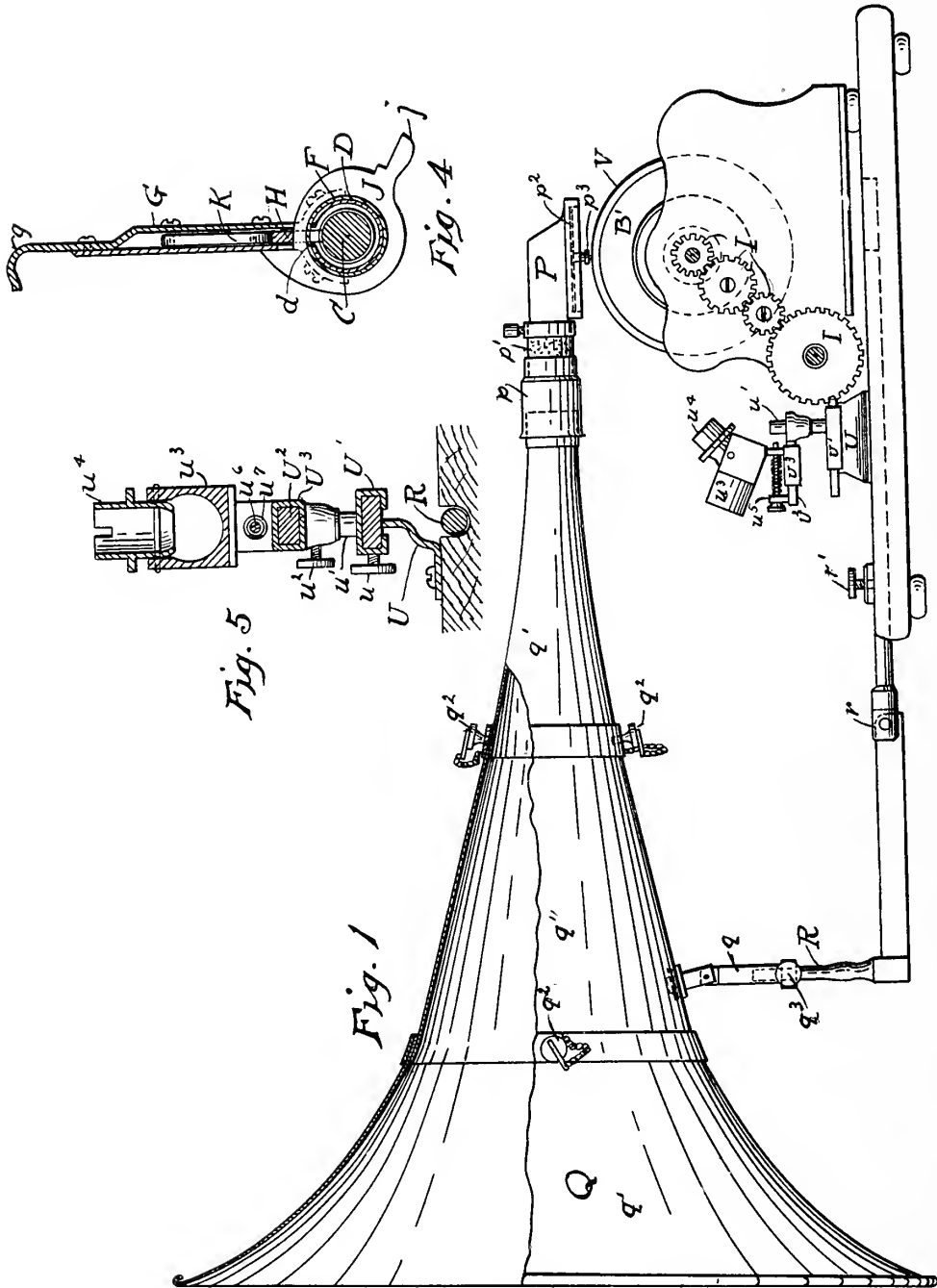
HENRY J. SUHRBIER.



L. DEVINEAU.
PHONOGRAPH.

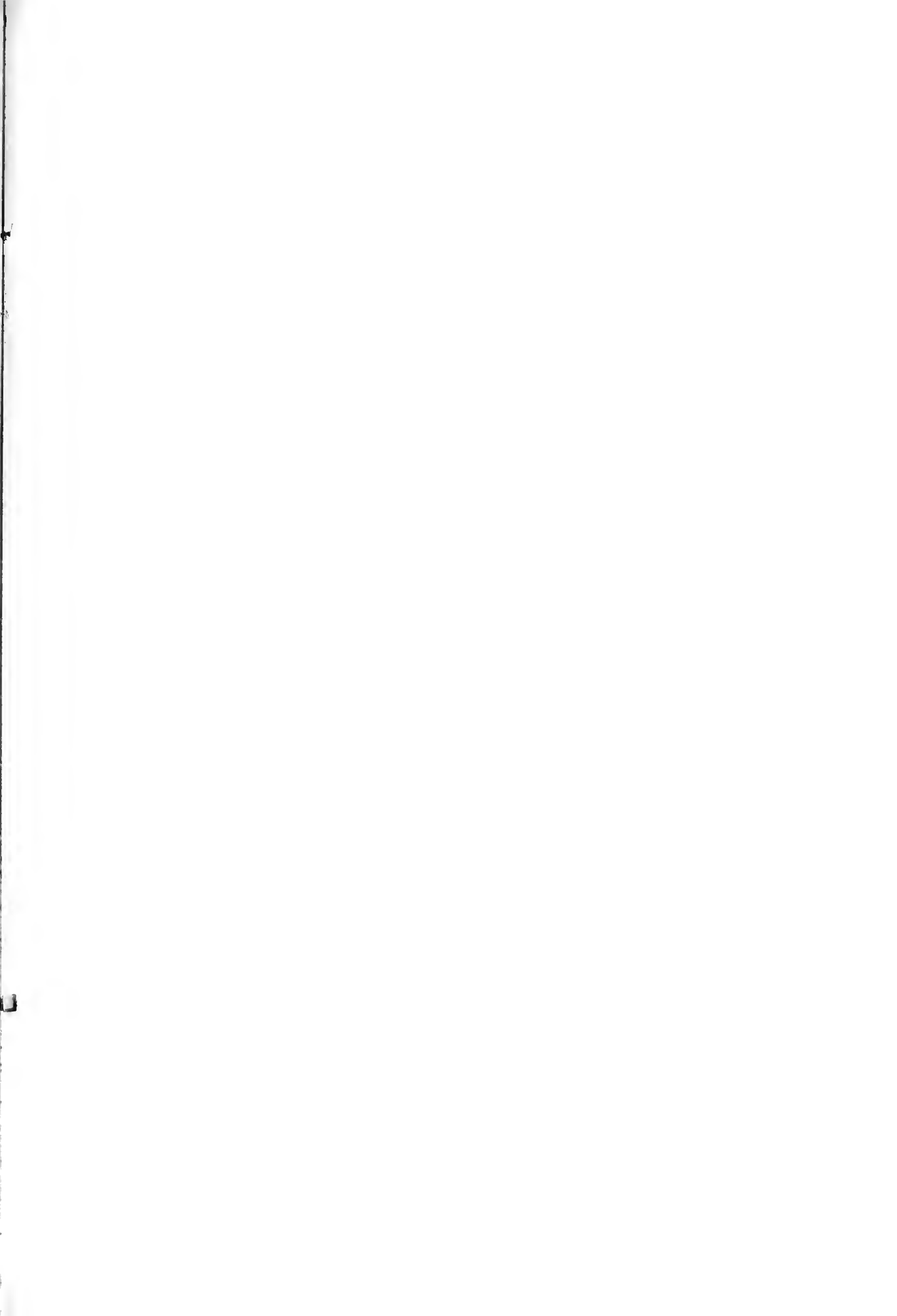
APPLICATION FILED JAN. 2, 1904.

2 SHEETS—SHEET 1.



M. H. McMullin }
 J. B. Hull. } Witnesses.

Louis Devineau,
 By his Attorneys,
 Thurston & Bates.



UNITED STATES PATENT OFFICE.

LOUIS DEVINEAU, OF CLEVELAND, OHIO.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 784,603, dated March 14, 1905.

Application filed January 2, 1904. Serial No. 187,401.

To all whom it may concern:

Be it known that I, LOUIS DEVINEAU, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Phonographs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The invention relates to improvements in phonographs of the type wherein the head for carrying the wax cylinder is slid along under the stylus, whereby the mechanism is made more simple and more efficient in operation. It also has reference to certain devices for supporting the horn in a substantially balanced position to allow the stylus to lightly rest upon the record and at the same time hold the horn to insure the mouth thereof being in alinement with the stylus and, further, to a device for holding the recording-stylus in proper position when making records.

The invention may be said to consist in the construction and combination of parts hereinafter set forth in the following description, drawings, and claims.

In the drawings, Figure 1 is an end view of my improved phonograph, the driving-motor and speed-governor being omitted. Fig. 2 is an end view from the opposite end, omitting the horn and its support. Fig. 3 is a longitudinal section along the main shaft and the revolving screw. Figs. 4 and 5 are details, being cross-sections taken on the line 4-4 of Fig. 3 and 5-5 of Fig. 2, respectively.

Referring to the parts by letters, A represents the main shaft. This may be driven by any suitable motor. A pulley *a* is shown on the shaft as a conventional representation of any connection to any motor. Slidably mounted on this shaft is a head B, which is adapted to receive the wax cylinder. This head has extending from it a boss or slide *b*, which carries a feather *b'*, extending into a groove *a'* in the shaft. Thus the head is compelled to rotate with the shaft, but may slide longitudinally thereon.

C represents a fine-threaded screw rotatably mounted parallel with the main shaft A.

Gearing I is shown as connecting this shaft with the main shaft, so that the two rotate simultaneously, though preferably at different speeds. Loosely surrounding the screw-shaft C is a tube D, mounted at one end in the supporting-bracket E, which carries the bearing *e* for the end of the screw-shaft, and at the other end in the bracket E', which surrounds the screw-shaft.

Loosely surrounding the tube D is a sleeve F, and secured to this sleeve is a hollow arm G, which contains a block H, which has teeth to mesh with the thread on the shaft C. Occupying a notch in the arm G and block H and surrounding the sleeve F is an annular ring having a cam *J* and an operating projection or handle *j*. The purpose of this cam is to force the block G away from the screw-threaded shaft against the force of a spring K within the hollow arm, pressing this block toward the screw-threaded shaft. Extending lengthwise of the tube D is a slot *d*, Fig. 4, and through this slot (when the arm G is extended in the direction toward the shaft A) the block H is adapted to pass, the sleeve F having an opening through it for this purpose. From this construction it results that if the cam-plate K is turned in the position shown in Fig. 2 the block H is forced outward against its spring K, and the arm G and sleeve F may be shifted longitudinally on the tube D or turned about the same, as desired. If, however, the arm G is swung into position so that the upper end *g* thereof rests upon the shaft A, then the block H is in alinement with the slot *d*, and if the cam-handle *j* is then turned down into the position shown in Fig. 4 the threaded edge of the block H will mesh with the threads of the screw C. The arm G will now be slowly moved longitudinally of the screw by means of its rotation, and this longitudinal movement will gradually shove along ahead of the arm the rotating head B. Thus it will be seen that the rotating head is given both a rotation and a longitudinal movement, so that the stylus need not travel, but may simply play in and out of the depressions on the wax cylinder.

If it is desired to use a larger size of wax cylinder than that fitting the head B, a metal

bushing (indicated by the dotted lines B') is slipped over the head B and the wax cylinder placed upon the bushing.

The extreme end of the shaft A is supported by the standard T, which is pivoted to a base-plate *t* and has a squared end which when the standard is in the upright position bears upon a leaf-spring *t'*, which thus holds it in this position.

In Fig. 1, V indicates the wax cylinder, which is adapted to be placed upon the large head B'. The reproducing-diaphragm *p*² is mounted in a casing P, which is removably secured to the end of the horn Q by a cork-lined ferrule *p*, adapted to embrace the end of the horn, and a rubber tube *p'*, connecting the ferrule with the casing P. The horn has a downwardly-extending hinged arm *q*, which is clamped by a set-screw *q*³ to a standard R, carried by the base. When the stylus-point *p*³, carried by the diaphragm, is in engagement with the wax on the cylinder, the horn is almost entirely balanced on its support, but bears lightly on the wax surface, the inner end playing up and down, according to the depressions therein. The rubber section *p'* prevents this light play from jarring the horn. I find by actual practice that this method of mounting the horn and providing relative travel between the stylus and the wax cylinder reduces to a minimum the extraneous metallic sounds which are the common characteristic of ordinary phonographs. The support R for the horn is an L-shaped member hinged at *r* and occupying a groove in the base-plate of the phonograph, being clamped by the set-screw *r'*. The horn itself is collapsible, being made of sections *q'*, suitably held together, as by set-screws *q*² passing through one portion of the horn into nuts secured to the adjacent portion, as shown, or by other suitable means—as, for instance, screw-threading each member into its adjacent member. The horn and its standard may thus be removed and collapsed into comparatively small space.

I provide the following mechanism to support the recorder and allow its accurate placing and its easy readjustment for different sizes of cylinders. On a horizontal rail U, carried by the base-plate of the phonograph, is slidably mounted a block U', which may be clamped to the rail by a set-screw *u*. Rising from the block U' is a cylindrical stud *u'*, and on this is swiveled a block U², which may be twisted around the stud as desired, being clamped in the desired position by a set-screw *u*². Slidably mounted upon the block U² is a slide U³, which rigidly carries a short sleeve *u*³, to which the recording speaking-tube is connected, and pivotally carries a short sleeve *u*⁴, to which the usual recorder is connected. This slide U³ is adjusted in and out by a screw *u*⁶, which is mounted in a lug *u*⁵, rising from the block U² and screwing

into the slide. A spring *u*⁷ presses the slide toward the stud *u'*.

By the above means the position of the recorder may be very accurately adjusted not only for different sizes of cylinders, but for each cylinder to give the very best effect, and when so adjusted the pivoting of the sleeve *u*⁴ allows the recorder to play lightly on the traveling cylinder. The speaking-tube is connected directly to the sleeve *u*³, wherefore the sound-vibrations pass directly to the recording-diaphragm.

In both recording and reproducing I have aimed at the same result—namely, the direct transmission of the vibrations and the light easy playing of the stylus on the wax surface, thus making a more accurate record and minimizing the extraneous sounds.

I claim—

1. In a phonograph, in combination, a rotating screw, a tube surrounding the same, an arm slidable upon the tube, means carried by the arm adapted to engage the screw, and a rotating and slidable head which said arm operates to, move longitudinally.

2. In a phonograph, in combination, a rotatable screw, a tube surrounding the same and having a longitudinal slot through it, an arm surrounding the tube and carrying the nut adapted to extend through said slot and engage the screw, and a rotatable head adapted to be shifted by said arm.

3. In a phonograph, in combination, a rotatable screw, a tube surrounding the same and having a longitudinal slot through it, a sleeve surrounding the tube, an arm rigidly secured to the sleeve, a nut carried within a recess in the arm and adapted to pass through said slot into engagement with the screw, and a head adapted to carry the impression-surface and be shifted by said arm.

4. In a phonograph, in combination, a rotatable screw, a tube surrounding the same and having a longitudinal slot therein, a sleeve surrounding said tube and slidable thereon, an arm carried by said sleeve, a nut mounted on said arm and adapted to pass through the slot in said tube and into engagement with the screw, a spring tending to bring about such engagement, an annular ring surrounding said sleeve and arranged to pass through openings in the nut and the arm, a peripheral cam upon said ring for raising said nut out of engagement with said screw, and means for rotating said ring.

5. In a phonograph, in combination, a rotatable screw, a tube surrounding the same and having a longitudinal slot therein, a sleeve surrounding said tube and loosely mounted thereon, an arm carried by said sleeve, a nut slidably mounted in said arm in a position to pass through said slot and engage said screw and having an opening therein, an annular ring loosely surrounding said sleeve and passing through the opening

in said nut, a peripheral cam upon said ring for raising said nut out of engagement with the screw, a stop upon said ring for engaging said arm and means for rotating said ring.

5 6. In a phonograph, in combination, a rotatable head, a rotatable screw, a tube surrounding the same and having a longitudinal slot therein, a sleeve surrounding said tube and slidably mounted thereon, a hollow arm carried by said sleeve and adapted to engage said head, a nut slidably mounted within said arm and adapted to pass through the slot in the tube and into engagement with the screw, a spring within said arm and bearing upon said nut for bringing about said engagement, a ring loosely mounted upon said sleeve, a cam upon said ring adapted to engage said nut and raise the same out of engagement with the screw, and means for rotating said ring.

7. In a phonograph, in combination, a recorder-support including a rail, a block slidable thereon, another block swiveled to the

block first mentioned, and a tube carried by said swiveled block.

8. In a phonograph, in combination, a recorder-support, comprising a sliding block, another block swiveled thereto, a tube-support slidable upon said swiveled block, and a screw and spring for moving said tube-support in one direction or the other.

9. In a phonograph, a recorder-support comprising the combination of a rail U, a sliding block U' having a stud *u'*, a second block U² swiveled on said stud, set-screws for clamping said two blocks, a tube-support slidably mounted upon said block U², and means for adjusting said tube-support upon said block U².

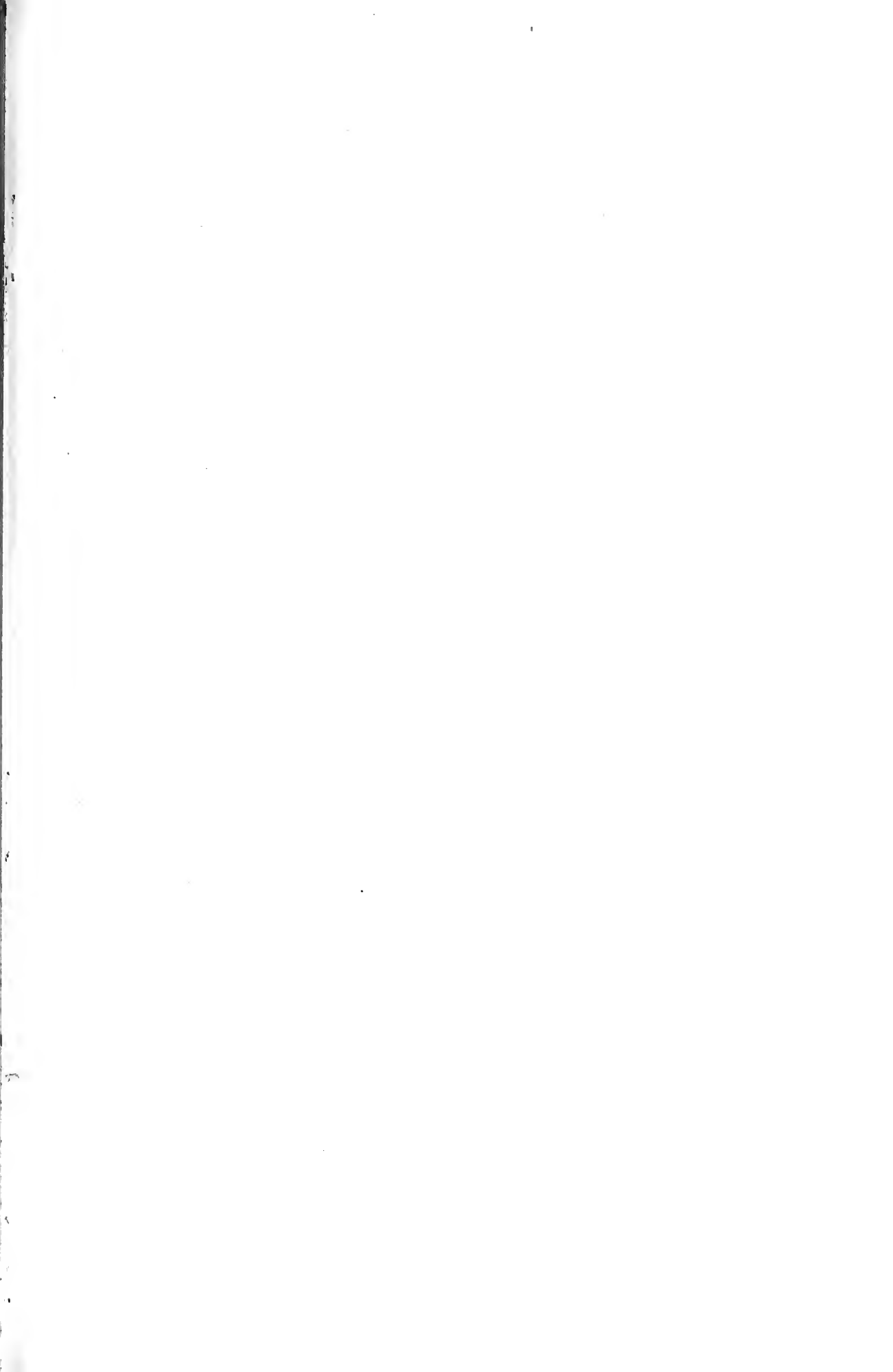
In testimony whereof I hereunto affix my signature in the presence of two witnesses.

LOUIS DEVINEAU.

Witnesses:

ALBERT H. BATES,
J. S. KOHN.]

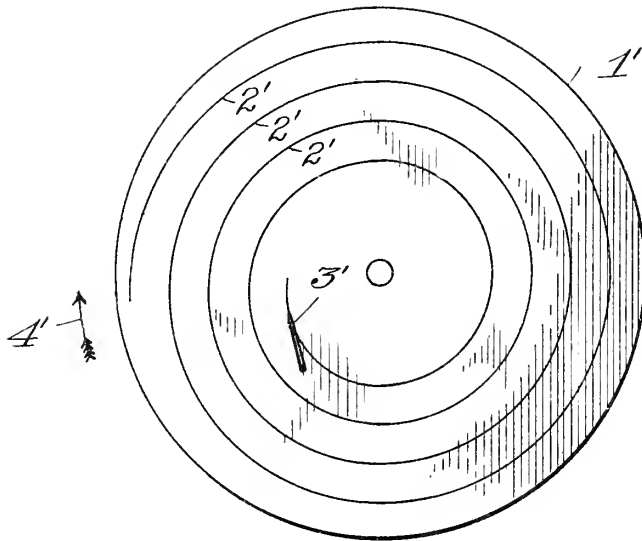




No. 785,191.

PATENTED MAR. 21, 1905.

H. S. BERLINER.
GRAMOPHONE RECORD.
APPLICATION FILED DEC. 1, 1904.



Inventor:

Herbert S. Berliner,

By *Lyons & Bisson,*

Attorneys.

Witnesses:

Edwin L. Jewell,

F. J. Chapman.

UNITED STATES PATENT OFFICE.

HERBERT S. BERLINER, OF WASHINGTON, DISTRICT OF COLUMBIA.

GRAMOPHONE-RECORD.

SPECIFICATION forming part of Letters Patent No. 785,191, dated March 21, 1905.

Application filed December 1, 1904. Serial No. 235,067.

To all whom it may concern:

Be it known that I, HERBERT S. BERLINER, a citizen of the United States, and a resident of Washington, in the District of Columbia, have
 5 invented certain new and useful Improvements in Gramophone-Records, of which the following is a specification.

My invention has reference to improvements in gramophone sound-record tablets,
 10 and is designed to overcome the gradual weakening and muffling of the reproduction from any individual gramophone-record as the reproduction proceeds from one end of the record-groove to the other.

15 It is a common experience that when the reproduction from a gramophone-record is started the sounds emitted by the reproducer are full, clear, and loud and that as the reproduction continues, whereby the reproducing-style
 20 engages successive portions of the record-groove, the reproduction becomes weaker and ever weaker as the end of the record is more and more approached. I have found that this lack of uniformity of the loudness and clear-
 25 ness of reproduction is due to two causes, which I will presently explain.

Gramophone-records are sinuous grooves produced in the surface of a flat disk of hard
 30 resisting material in a spiral which, beginning near the edge of the disk, gradually approaches the center thereof, so that the convolutions become gradually smaller as the end of the record is approached. In the act of recording
 35 the disk upon which the record is made is rotated with uniform velocity, from which it follows that the surface speed of the disk under the recording-style is greatest at the beginning
 40 of the record and gradually diminishes and is smallest at the end of the record. It follows also from this that any given sound will be represented on the record by the same
 45 number of undulations on all arcs of the spiral that are measured by the same angle from the center. Thus, for instance, if on an arc of, say, ten degrees on the innermost spiral there are, say, one hundred undulations for a given sound then on an arc of ten degrees on the outermost spiral and on each intermediate spiral there are also one hundred undulations for the same

50 sound. In other words, the same angular measure of arc has the same number of undulations for the same sound. Now it is well known that for reasons which need not be here explained the record is more perfectly inscribed when the
 55 recording-disk moves at the higher surface speed under the style and, similarly, that the reproduction is more perfect when the record-disk moves at that higher surface speed under the reproducing-style. As a consequence of
 60 this and since in reproducing the record-disk is again moved with uniform angular velocity from beginning to end the reproduction at the beginning will be the loudest and clearest and will gradually weaken and become more in-
 65 distinct as the convolutions of the spiral under the style become smaller toward the end of the record. Another and still more powerful cause for the weak and indistinct reproduction obtained from the end of the record
 70 is found in the fact that owing to the hard resisting material of the disk the reproducing-style is ground off by the record-groove, so that a tongue is formed at the point of the style. This tongue when first formed fits the
 75 groove rather snugly; but as the reproduction continues it becomes thinner and does not fill the groove any more, whereby lost motion of the style and diaphragm is experienced. Now
 80 in the ordinary gramophone-record these two causes conspire to make the reproduction weaker and more indistinct toward the end of the record, for the reproducing-style which has been ground off and which thus becomes
 85 mutilated by the first and better part of the record has now to reproduce from the poorer part of the record. As a consequence of all this it has been found impracticable to make a record-groove of much greater length than is
 90 now ordinarily made, and particularly has it been found impracticable to continue the record-groove as close toward the center of the disk as might be done if the style were not ground off by the first and better part of the
 95 record-groove and if the decreasing diameter of the spiral toward the center did not result in a weaker and less distinct record. By my invention this imperfection in gramophone reproduction is largely overcome, and the in-

vention broadly consists in a gramophone-record tablet in which a sound-record groove begins at the inner end of the spiral and progresses outwardly and terminates at the outer end of the record-groove, but still has for the same sound the same number of undulations on all arcs of the spiral that are measured by the same angle drawn from the center. With this construction reproduction is obtained by bringing the reproducing-style into engagement with the inner end of the spiral at the start and then propelling it and its reproducer-head or sound-box gradually outwardly until the outer end of the spiral is reached. By this mode of reproduction, which follows of necessity from the new mode of recording, the new style primarily engages the poorer part of the record—that part which is unavoidably the less perfect. The needle is then gradually ground off at its point into a tongue by the hard resisting material of the disk, and the more it is ground off—that is to say, the more the needle becomes deteriorated—it engages gradually the more and more perfect part of the record—namely, the part which is inscribed in the spiral of the greater and greater diameter.

It will be seen from the foregoing that while in reproducing from the ordinary gramophone-record tablet the style when in its best condition engages the best part of the record and when in its poorest condition engages the poorest part of the record, with my invention the style when in its best condition engages the poorest part of the record and when in its poorest condition engages the best part of the record. At first sight it would seem that by this arrangement the improvement of reproduction from the parts of the spiral of smaller diameter secured by my invention is in a manner counterbalanced by the weakening of the reproduction from the parts of the spiral which has the greater diameters. This, however, is not the case, since the part of the record inscribed on the spirals of larger diameter will be reproduced by a style which has been ground off almost, if not quite, as well as if the style were quite new and had not been ground off, so that as a matter of fact by my improvement the reproduction not only becomes uniform, but it becomes uniformly good.

The accompanying drawing, which forms a part of this specification, shows a diagram illustrating my improved construction of gramophone-record tablet.

On the ordinary gramophone-record disk the sound-groove starts near the edge of the plate and continues in a spiral line in a counter-clockwise direction toward the center of the disk, and the record terminates with or near the inner end of the spiral. In reproducing from such record the reproducing-style is brought into engagement with some part of the outer turn of the spiral groove, and the rec-

ord-disk is rotated in the clockwise direction. As is well known, the style, with the sound-box on which it is mounted, is propelled by the record-groove itself inwardly across the record-tablet, and thereby its point comes successively in engagement with all parts of the record.

In my improved gramophone-record disk 1' the record-groove starts or may start with or in the first innermost turn of the spiral groove 2', and this spiral continues outwardly counter-clockwise and terminates with or in the last outer turn of the spiral. In reproducing from this plate the style 3' is at the start placed in engagement with some part of the inner spiral, and the plate is rotated, as in the machines now on the market, in the direction of the arrow—namely, clockwise. It will be seen from this that my improved gramophone-record tablet may be used with the ordinary gramophone-reproducer machine now on the market.

In reproducing from any gramophone-record tablet the style must incline at an acute angle to the plane of the gramophone-disk in the direction opposed to that of the movement of the disk, so that the point of the style may trail in the record-groove. By reference to the drawing it will be seen that with the record-groove constructed in accordance with my invention the inclination of the reproducing-style will be precisely the same as that in the old form of gramophone-record, so that no change whatever has to be made in the ordinary gramophone-reproducing machine to adapt it for use with my improved record-tablet, so long as the precaution is observed to place the style in engagement with the record-groove on the same side of the center of the disk as is now done with the ordinary record-tablet. This is due to the fact that whereas the record spiral in the old gramophone-disk proceeds counter-clockwise from the outer turn inwardly in my improved tablet the record-groove proceeds spirally counter-clockwise from the inner turn of the spiral outwardly.

I am of course not limited to this particular arrangement of the spiral, for I may just as well make the record-groove to proceed from the inner turn outwardly in a clockwise direction; but in that case either the direction of rotation of the disk in the act of reproducing or both the direction of rotation of the disk and the direction of inclination of the style have to be changed, so that the ordinary reproducing apparatus would have to be modified to adapt for use with my improved record-tablet.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. A gramophone-record tablet having a sound-record groove progressing spirally outwardly, substantially as described.
2. A gramophone-record tablet composed

of a disk of hard resisting material having a sound-record groove progressing spirally outwardly, substantially as described.

3. A gramophone-record tablet having a
5 sound-record groove progressing spirally outwardly in counter-clockwise direction, substantially as described.

4. A gramophone-record tablet having a
10 sound-record groove progressing spirally outwardly and having for the same sound the same number of undulations in the same angular measure of arc of the spiral, substantially as described.

5. A gramophone-record tablet composed
15 of a disk of hard resisting material having a sound-record groove progressing spirally outwardly and having for the same sound the

same number of undulations in the same angular measure of arc of the spiral, substantially as described. 20

6. A gramophone-record tablet having a
25 sound-record groove progressing spirally outwardly in counter-clockwise direction and having for the same sound the same number of undulations in the same angular measure of arc of the spiral, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERBERT S. BERLINER.

Witnesses:

F. T. CHAPMAN,

EDWIN S. CLARKSON.



No. 785,316.

PATENTED MAR. 21, 1905.

G. A. MANWARING, V. H. EMERSON, E. E. NORTON & F. L. CAPPS.

PRODUCTION OF SOUND RECORDS.

APPLICATION FILED APR. 14, 1904

FIG. 1.

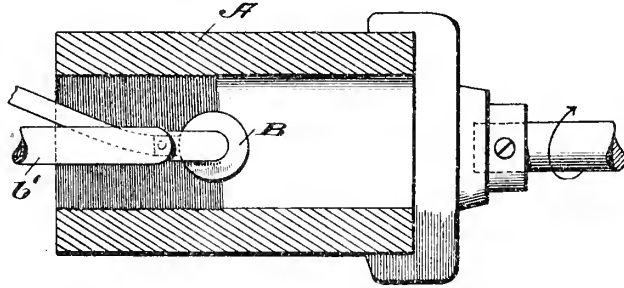


FIG. 2.

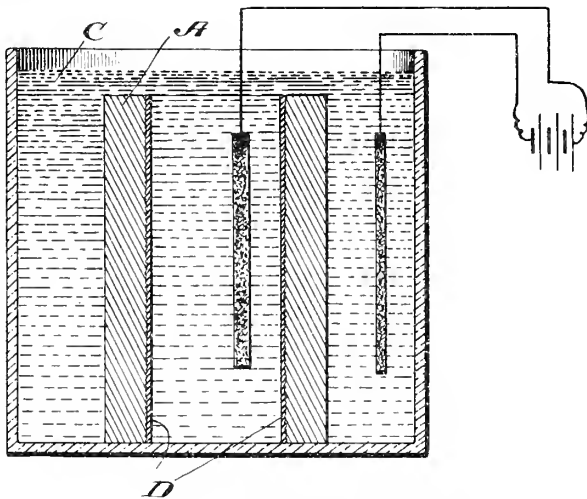


FIG. 3.

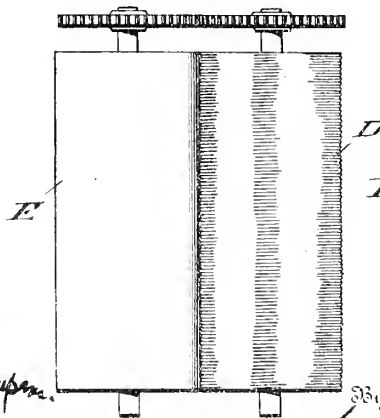
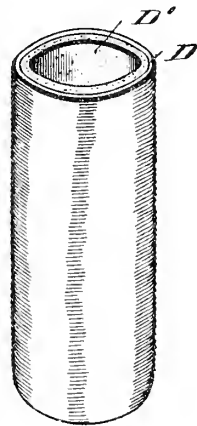


FIG. 4.

Witnesses
Hubert R. Thompson
Wm B. Ketchum

Inventors
George A. Manwaring,
Victor H. Emerson,
Eugene E. Norton and
Frank L. Capps,
Manuel Cameron, Paris Massie,
 Attorneys

UNITED STATES PATENT OFFICE.

GEORGE ABBOTT MANWARING, OF BAYONNE, AND VICTOR H. EMERSON, OF NEWARK, NEW JERSEY, EUGENE E. NORTON, OF NICHOLS, CONNECTICUT, AND FRANK L. CAPPS, OF LONDON, ENGLAND, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

PRODUCTION OF SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 785,316, dated March 21, 1905.

Application filed April 14, 1904. Serial No. 203,233.

To all whom it may concern:

Be it known that we, GEORGE ABBOTT MANWARING, of Bayonne, Hudson county, and VICTOR H. EMERSON, of Newark, Essex county, New Jersey, EUGENE E. NORTON, of Nichols, Fairfield county, Connecticut, and FRANK L. CAPPS, a citizen of the United States, temporarily residing in London, England, have invented a new and useful Improvement in Production of Sound-Records, which is fully set forth in the following specification.

Our invention relates to the production of cylindrical sound-records by the nurling process; and it consists in the features hereinafter pointed-out and claimed.

We first produce an original sound-record upon the inner wall or bore of a hollow cylinder. We next produce upon this record-surface an electroplate which is a unitary and seamless metallic cylinder having the sound-record in reverse deposited directly upon its external surface, and we finally remove this metal cylinder and roll or nurl its record-surface against the external surface of a blank cylinder capable of receiving impressions therefrom.

The invention will best be understood by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the original cylinder while being engraved. Fig. 2 is a similar view of the same while in the plating-bath. Fig. 3 is a perspective of the electroplate, and Fig. 4 is a plan indicating the final step of nurling.

A represents a hollow cylinder composed of suitable material, which for convenience may be designated "wax" or "wax-like," being of any substance suitable for making original sound-records.

B represents a recording device which contains a diaphragm and a recording-stylus that is acted upon by sound-waves through a tube *b* according to well-known principles. If desired, the bore of cylinder A may be slightly

tapered to facilitate subsequent removal of the electroplate. The cylinder is caused to revolve, and the recording device is caused to progress longitudinally within the cylinder by any suitable mechanism. The mere production of an original sound-record upon the internal surface of a hollow cylinder is not in itself new and may be accomplished by any desirable means. This original sound-record is electroplated in a bath C in the usual manner to secure the electroplate D, deposited upon the record-surface, within the bore of the cylinder A. This electroplate D will preferably be backed up by a strengthening-core D', which may be of any desirable material and may be secured to the cylinder D in any convenient manner. The electroplate, with its backing, is then removed from the cylinder A.

E represents a blank cylinder or "blank" of any suitable material. It may be of the ordinary wax-like composition above referred to, or it may be of the "hard material" now employed in making disk records, or it may even be of still harder materials, metals, or the like. The cylinder E is placed in juxtaposition to the strengthened cylinder D, the two being mounted parallel in suitable mechanism that presses them together gradually, but forcibly, while causing them to revolve with absolute synchronism.

The electroplate D is an integral and continuous metallic cylinder having the sound-record produced by electrolysis directly upon its external surface, whereas heretofore in nurling sound-records the electroplate when first produced contains the record within its bore and is then split longitudinally and flattened or even rolled all the way back to present the record externally, the meeting ends of the electroplate being matched together more or less poorly and then soldered.

The step of making the original record is not new. The step of electroplating a record-surface is not new in itself and may be accomplished in any desirable manner, and, in fact,

some other method than electrolysis may be employed for producing the cylinder containing the reverse record. The step of nurling upon a blank cylinder the irregularities contained by another cylinder is not in itself new and may be accomplished by any convenient mechanism; but our invention consists in the employment of all three of the steps above pointed out in the order stated. Our invention in another aspect consists in employing for the purpose of nurling a sound-record upon a blank cylinder a unitary and seamless metallic cylinder having a sound-record directly electroplated upon its external cylindrical surface. Our invention consists also in the electroplate itself. We do not believe that such electroplate-cylinder has ever been produced before, and we do not believe that sound-records have ever been produced by nurling from such electroplate.

The particular means pointed out for carrying on the various steps of our invention are explained merely for convenience, and we do not limit ourselves to their exact forms and arrangements, nor do we limit ourselves to the particular type of record-groove.

Having thus described our invention, we claim:-

1. The method of duplicating sound-records that comprises making a sound-record upon the interior of a cylindrical bore, producing a reversed copy thereof on the external sur-

face of a cylinder, and nurling said reversed copy against a blank cylinder.

2. The method of duplicating sound-records that comprises making a sound-record upon the interior of a cylindrical bore, producing by electrolysis thereupon a cylinder containing on its exterior a reverse copy of said record, and nurling said reverse copy against a blank cylinder.

3. The method of duplicating sound-records that comprises engraving an original sound-record upon the interior of a cylindrical bore in a body of wax-like composition, producing by electrolysis thereupon a cylinder containing upon its exterior a reverse copy of said record, and nurling said reverse copy against a blank cylinder.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

GEORGE ABBOTT MANWARING,
VICTOR H. EMERSON,
EUGENE E. NORTON,
FRANK L. CAPPS.

Witnesses for Manwaring, Emerson, and Norton:

C. A. L. MASSIE,
R. L. SCOTT.

Witnesses for Capps:

F. PATTADOW,
H. P. SMITH.

1
2

No. 785,317.

PATENTED MAR. 21, 1905.

G. A. MANWARING, V. H. EMERSON, F. L. CAPPS & E. E. NORTON.

SOUND RECORD.

APPLICATION FILED OCT. 4, 1904.

Fig. 1.

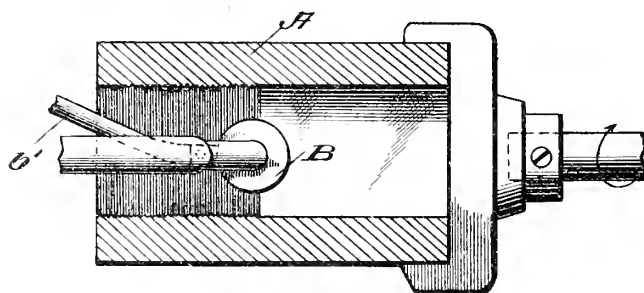


Fig. 2.

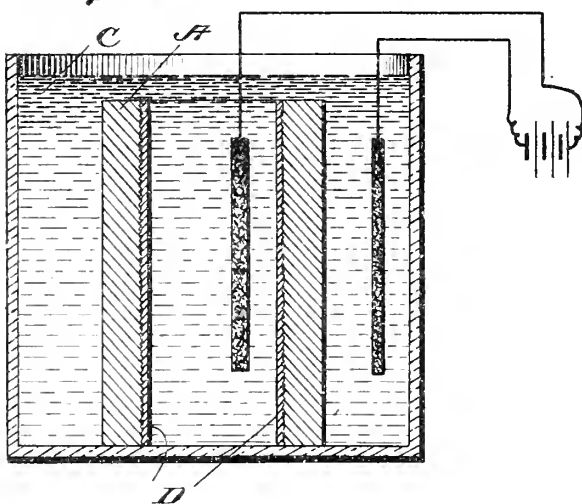
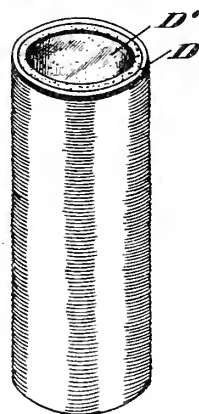


Fig. 3.



Witnesses

Wm. B. Kerkaus
Russell R. Thompson.

Inventors,

George A. Manwaring,
Victor H. Emerson,
Eugene E. Norton and
Frank L. Capps,

By

Mauro, Cameron & Lewis
 Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE ABBOTT MANWARING, OF BAYONNE, AND VICTOR H. EMERSON, OF NEWARK, NEW JERSEY, FRANK L. CAPPS, OF LONDON, ENGLAND, AND EUGENE E. NORTON, OF NICHOLS, CONNECTICUT, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SOUND-RECORD.

SPECIFICATION forming part of **Letters Patent No. 785,317**, dated **March 21, 1905**.

Original application filed April 14, 1904, Serial No. 203,233. Divided and this application filed October 4, 1904. Serial No. 227,170.

To all whom it may concern:

Be it known that we, GEORGE ABBOTT MANWARING, of Bayonne, Hudson county, and VICTOR H. EMERSON, of Newark, Essex county, New Jersey, FRANK L. CAPPS, residing in London, England, and EUGENE E. NORTON, of Nichols, Fairfield county, Connecticut, all citizens of the United States, have invented a new and useful Improvement in Sound-Records, which is fully set forth in the following specification.

Our invention relates to the production of metallic cylindrical sound-records which are primarily intended for use in nurling commercial sound-records, but which may be used for other purposes.

The present application is a division of our pending application. Serial No. 203,233, filed April 14, 1904. In that application we described and claimed the method of producing commercial sound-records in quantities, which, in brief, consists in first making an original sound-record upon the inner wall or bore of a hollow cylinder, next depositing an electroplate upon this interior surface, and finally removing this electroplated cylinder from the original record, after which this metal record is ready for nurling or other use.

In the accompanying drawings, Figure 1 is a longitudinal sectional view representing the formation of the original record upon the interior of a cylinder. Fig. 2 is a similar representation of the cylinder while in a plating-bath, and Fig. 3 is a perspective of a metallic sound-record forming the subject-matter of the present application.

A represents a hollow cylinder composed of suitable material, which for convenience may be designated "wax" or "wax-like," being of any substance suitable for making original sound-records.

B represents a recording device which contains a diaphragm and a recording-stylus acted upon by sound-waves through a tube *b'* according to well-known principles. If de-

sired, the bore of cylinder A may be slightly tapered to facilitate subsequent removal of the electroplate. The cylinder is caused to revolve, and the recording device is caused to progress longitudinally within the cylinder by any suitable mechanism. The mere production of an original sound-record upon the internal surface of a hollow cylinder is not in itself new and may be accomplished by any desirable means. This original sound-record is electroplated (as in a bath C in the usual manner) to secure the electroplate D, deposited upon the record-surface within the bore of the cylinder A. This electroplate D will preferably be backed up by a strengthening-core D', which may be of any desirable material and may be secured to the cylinder D in any convenient manner. The electroplate, with its backing, is then removed from the cylinder A and is ready for use. This electroplated cylinder D is an integral and continuous (seamless) unitary article, having the sound-record proper formed in reverse upon its external surface and having no longitudinal ridge or fin to mar its record-surface.

We are aware that metallic record-cylinders have been proposed heretofore; but our metallic record differs from them, as will now be pointed out. Such records have sometimes been made by direct mechanical action, the recording-stylus operating (in more or less ineffective fashion) to cut or gouge out the material upon the external surface of the metallic cylinder. Owing to the comparative feebleness of the sound-waves and the comparative hardness of metal the record proper—*i. e.*, the actual cuts or gouges—is shallow (where made) and is an inaccurate representation of the path of the recording-stylus. In short, such records are impracticable and worthless. Our new metallic record differs from these in that, first, it is of electrodeposited metal; second, having the record in reverse, and, third, in that it corresponds truly and accurately with the original sound-waves.

5 Metallic record-cylinders have also been formed by electroplating upon the exterior of an original record-cylinder; but in this case the record proper is found upon the interior
 10 of the metal cylinder—that is, within its bore—and sometimes such tubular metal records have been cut through longitudinally and flattened out or even rolled up in such manner as to present the record upon the exterior of
 15 the cylinder thus formed; but in the latter case the cylinder will present a seam where the two edges have been joined. Our new metallic record differs from these articles in presenting the record upon its exterior and in being seamless. The presence of the seam, it is needless to say, renders the record absolutely worthless either for direct audible reproduction or for nurling commercial records.

20 Metallic record-cylinders have also been formed by electroplating with a different metal upon the inner surface of the metallic cylinders referred to in the preceding paragraph and then removing the latter by the action of
 25 acid. The records thus formed are not in reverse and are therefore unfitted for nurling, since the knurled records would have ridges instead of grooves and could not be employed

with the talking-machines now on the market. Our new records differ from these metallic records in having the sound-record on the exterior surface in reverse ready for making a knurled cylinder with its sound-record in the normal position.

Having thus described our invention, we claim—

A seamless cylinder presenting as its exterior surface an electrodeposited sound-record in reverse.

In testimony whereof we have signed this specification in the presence of the subscribing witnesses.

GEORGE ABBOTT MANWARING.
 VICTOR H. EMERSON.
 FRANK L. CAPPS.
 EUGENE E. NORTON.

Witnesses for Manwaring and Emerson:

DANIEL SULLIVAN,
 WM. HACKLAND.

Witnesses for Capps:

R. WESTACOTT,
 A. NUTTING.

Witnesses for Norton:

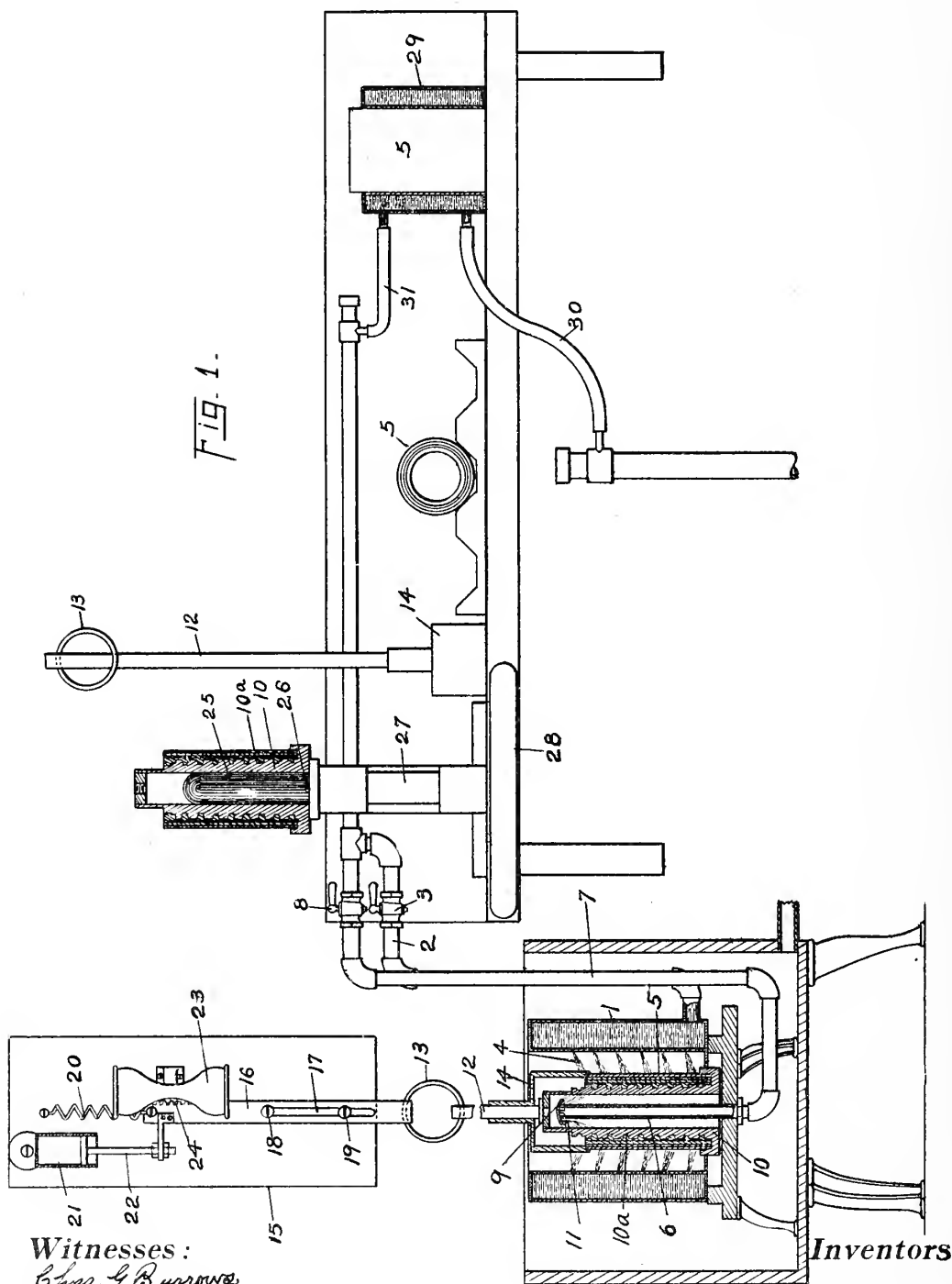
JNO. R. PETRIE,
 J. B. BOLLING.



W. H. MILLER & A. N. PIERMAN.

APPARATUS FOR PRODUCING MOLDED RECORDS AND BLANKS.

APPLICATION FILED MAY 24, 1904.



Witnesses:

Chas. L. Burrows

Delos Stolden

Inventors

WALTER H. MILLER

ALEXANDER N. PIERMAN

BY *Frank L. Spurr*
Attorney.



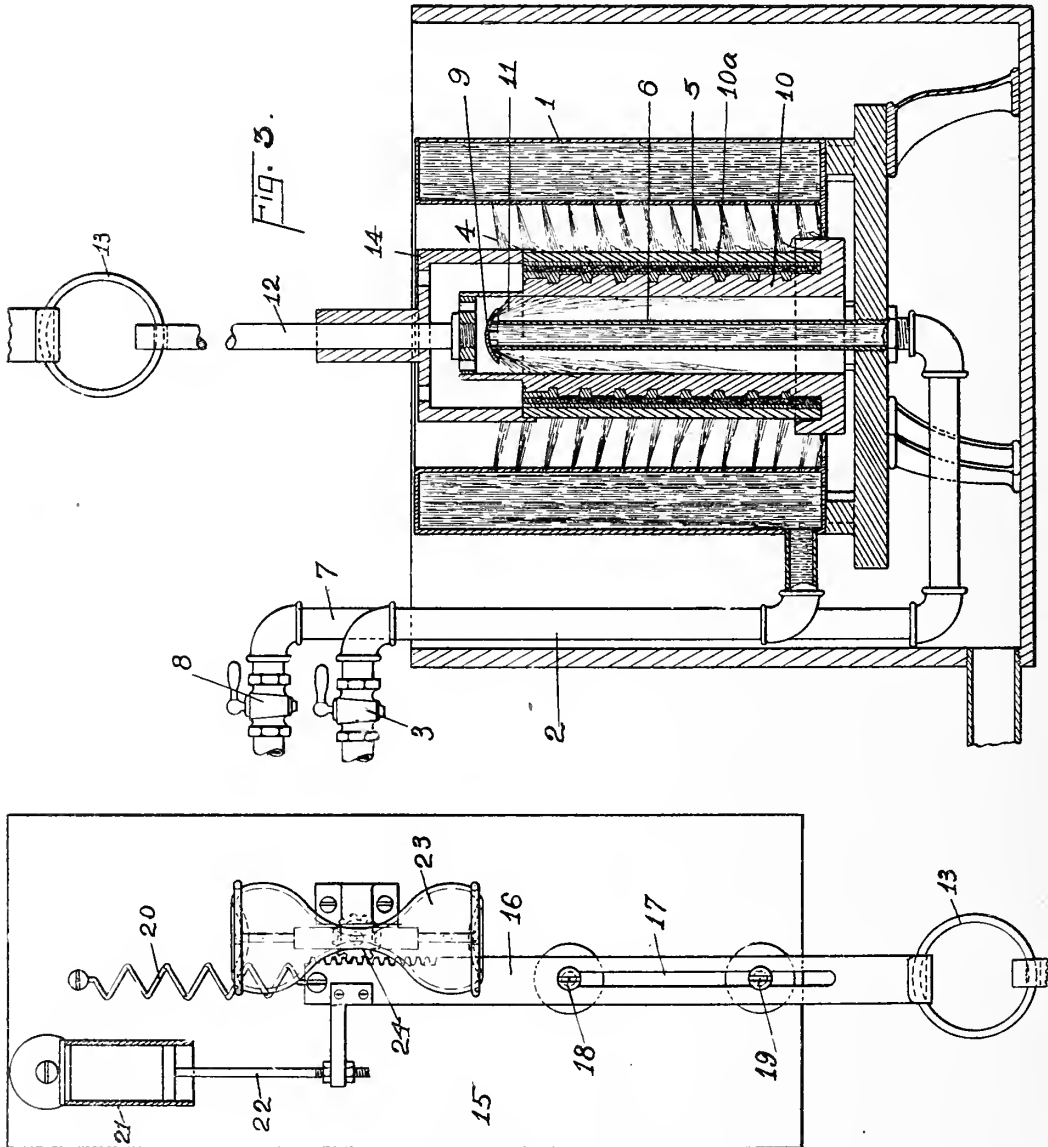
No. 785,319.

PATENTED MAR. 21, 1905.

W. H. MILLER & A. N. PIERMAN.
APPARATUS FOR PRODUCING MOLDED RECORDS AND BLANKS.

APPLICATION FILED MAY 24, 1904.

2 SHEETS—SHEET 2.



Witnesses:

Chas. G. Burrows
Belov Holdens

FIG. 2.

Inventors

WALTER H. MILLER
ALEXANDER N. PIERMAN

By *Frank L. Piper*
Attorney.

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR PRODUCING MOLDED RECORDS AND BLANKS.

SPECIFICATION forming part of Letters Patent No. 785,319, dated March 21, 1905.

Application filed May 24, 1904. Serial No. 209,570.

To all whom it may concern:

Be it known that we, WALTER H. MILLER, a resident of Orange, and ALEXANDER N. PIERMAN, a resident of Newark, county of Essex, State of New Jersey, citizens of the United States, have invented certain new and useful Improvements in Apparatus for Producing Molded Records and Blanks, of which the following is a specification.

Our invention relates to apparatus for the production of molded phonograph records and blanks, and has for its object the provision of means whereby the records and blanks may be produced cheaply and removed from their molds in the least possible time and with the least possible chance of injury thereto as regards the surfaces of the said records and blanks.

In the drawings which accompany this specification, Figure 1 is a sectional elevation of the apparatus which forms the subject-matter of the application. Fig. 2 is an elevation, partly in section, on an enlarged scale, of certain parts shown in Fig. 1; and Fig. 3 is an enlarged vertical section of certain other parts shown in Fig. 1.

We have indicated corresponding parts in the several views by means of the same reference-numerals.

In producing molded phonograph records and blanks we have found it desirable to use molds composed of a hollow core and a cylindrical matrix surrounding the same and supported thereby. This mold is introduced into a suitable bath of molten material from which the record or blank is to be formed and is then removed therefrom and allowed to cool. It is desirable, in order that the records and blanks may be removed from the mold without injury to their surfaces, that the mold be chilled or cooled by the application of some cooling medium, such as water, to the exterior surface of the mold and the interior of the core. This causes the record or blank to contract, so that the core may be removed therefrom, and upon further cooling the contraction is sufficient to enable the record to be withdrawn longitudinally from the mold without the least

injury to the record-groove which has been formed thereon by the surface of the mold. The present application relates to apparatus whereby the above process may be performed more readily, with greater economy, and with less danger of injury to the records or blanks than by any other means heretofore known to us.

Our apparatus comprises a cooling device consisting of a cylindrical water jacket or tank 1, connected with a suitable water-supply by means of a pipe 2, having a valve 3 and provided on its interior surface with numerous small apertures through which jets of water 4 may be discharged against the exterior surface of the mold 5. The said cooling device also comprises a vertical pipe 6, supplied with water from a pipe 7, controlled by a valve 8. The top of the pipe 6 is provided with any suitable means 9 which permit the discharge of the water against the interior of the core 10 in the form of a spray or jets 11. The mold 5 is supported by a lateral extension from the core 10, as shown. The exterior of the core is provided with a helical groove 10^a for producing a helical rib on the interior of the record or blank. The core is provided with an upwardly-extending rod 12, whose upper end carries a ring 13. Sleeved upon the rod 12 is a cap 14 for inclosing and centering the upper portion of the mold 5.

In the use of a cooling device such as has been described it is desirable that the heated mold be subjected to the cooling action thereof for a definite time, which should not be too great nor yet too small. We therefore provide a timing device by which the time during which the mold is placed in the cooling device may be indicated. This device, as shown, consists of a base 15, on which is mounted a vertical rack 16, having a slot 17, in which stops 18 and 19 are placed to limit the extreme positions of the said rack. The rack is normally held in its extreme upper position by means of a spring 20, secured at one end to the base 15 and at the other end to the rack 16. The lower end of the rack is bent to form a hook for receiving the ring 13, car-

ried by the rod 12, whereby the rod, core, and mold may be suspended from the rack 16. The weight of these parts draws the rack 16 downward against the action of the spring 20 until stopped by the pin 18. This movement is made slow and regular by means of a dash-pot 21, secured to the base 15 and having a piston whose rod 22 is connected to the rack 16, as shown. The time-indicator consists of a glass 23, containing sufficient sand or other material to indicate the exact number of minutes or seconds during which it is desired to have the mold and core acted upon by the cooling device. This timing-glass is capable of oscillation about a horizontal axis, being secured to a pinion 24, which meshes with the teeth of the rack 16, the arrangement being such that the vertical movement of the rack causes the pinion to oscillate through an arc of one hundred and eighty degrees. Thus when the mold is hung from the rack 16 the same is lowered and at the same time the glass 23 is oscillated through an angle of one hundred and eighty degrees and the sand immediately begins to descend into the empty compartment. As soon as the upper compartment is emptied the operator lifts the mold, removing the ring 13 from the rack 16, and the rack is drawn to its upper position by the spring 20. The timing-glass 23 is thus returned to its original position and the sand descends to the other compartment, thereby providing for a repetition of the operation upon another mold. The operator then unscrews the rod 12 from the core 10 and places the latter upon the mandrel 25. This mandrel is provided with one or more pins 26, which engage slots or recesses in the lower portion of the core. The mandrel and core are then rotated by means of the shaft 27 and hand-wheel 28, while the mold is held against turning by the operator, with the result that the core is unscrewed from the record or blank contained in the mold. The mold containing the said record or blank is then passed along for further treatment. This treatment consists in placing the mold within a water-jacket 29 until the record or blank is shrunk sufficiently to be removed longitudinally from the mold without injury to the surface thereof. The water-jacket 29 is supplied with a cooling medium from the supply-pipe 30 and leaves the same through an outlet-pipe 31. The outlet 31 is connected to the pipes 2 and 7 for supplying the cooling device 1. Thus the cooling medium is used when at its lowest temperature in the water-jacket 29 for cooling the partly-cooled mold and then passes to the cooling device 1 for treating the hot molds. By this means we use the water or other cooling medium in the most efficient manner and are able to reduce the quantity required.

We do not desire to limit ourselves to the exact structures illustrated.

What we claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the character described, a movable support, a mold suspended therefrom, and means acting in opposition to the weight of said mold to move the support, substantially as set forth.

2. In an apparatus of the character described, a movable support, a mold suspended therefrom, a stop for limiting the movement of said support, and means acting in opposition to the weight of said mold to move the support, substantially as set forth.

3. In an apparatus of the character described, a movable support, a mold suspended therefrom, stops for limiting the movement of said support in each direction and means acting in opposition to the weight of said mold to move the support, substantially as set forth.

4. In an apparatus of the character described, a movable support, a mold suspended therefrom, a dash-pot connected to said support, and means acting in opposition to the weight of said mold to move the support, substantially as set forth.

5. In an apparatus of the character described, a water-supply, a cylindrical water-jacket connected therewith for receiving a mold, a pipe leading from said water-jacket to a second water-jacket, having openings in its interior surfaces which permit the discharge of the water, substantially as set forth.

6. In an apparatus of the character described, a water-supply, a cylindrical water-jacket connected therewith, a pipe leading from said water-jacket to a second cooling device having one or more openings which permit the discharge of the water, substantially as set forth.

7. In an apparatus of the character described, a water-supply, a cylindrical water-jacket connected therewith, pipes leading from said water-jacket to a second cooling device, having an inner, rod-like member situated within an outer surrounding member, both members having openings which permit the discharge of the water.

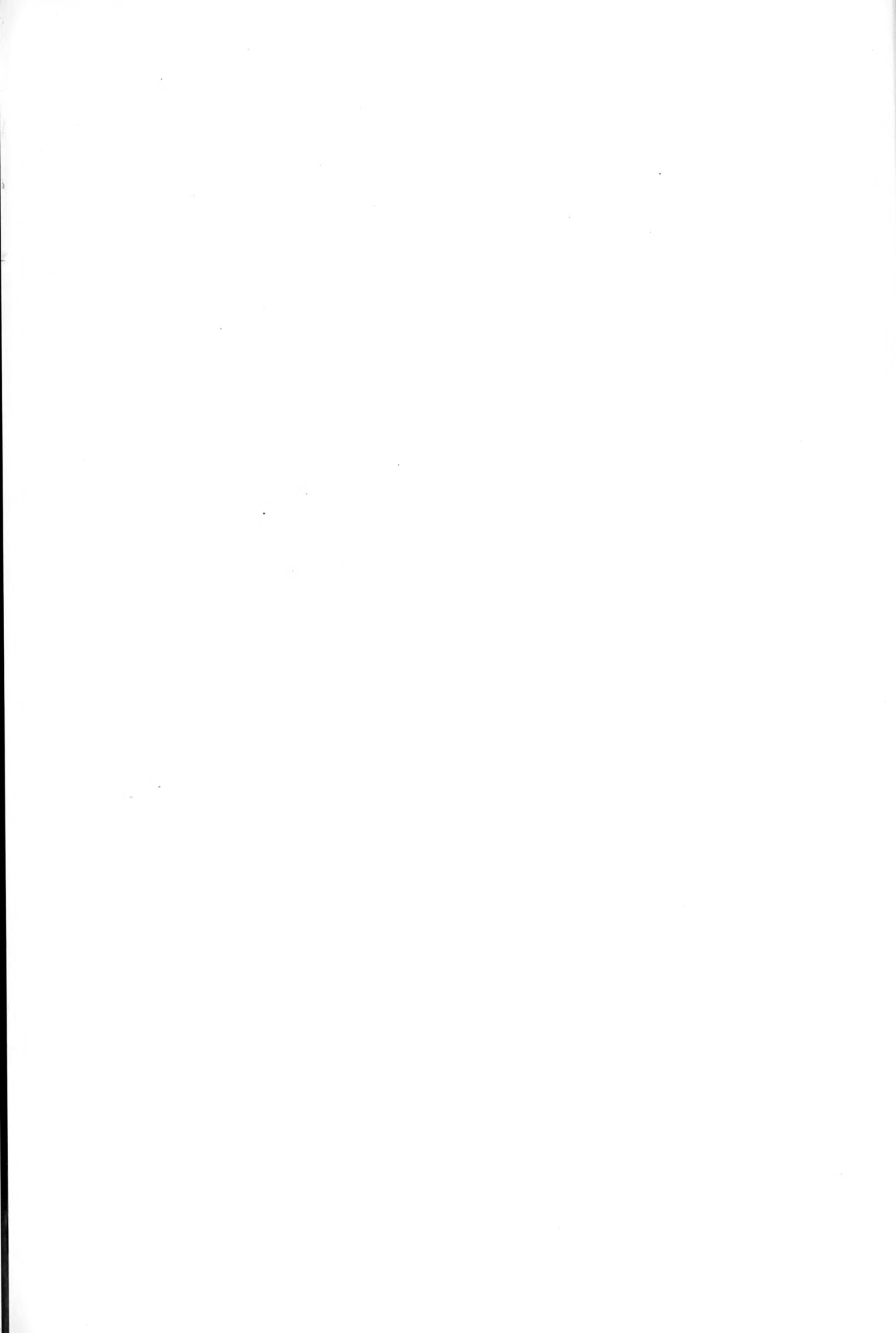
8. In an apparatus of the character described, a mold having a hollow cylindrical core, provided with a helical groove on its exterior surface, a mandrel inserted within said core, and having means for engaging said core, and means for rotating said mandrel whereby the core may be unscrewed from the blank or record contained in the mold, substantially as set forth.

This specification signed and witnessed this 7th day of May, 1904.

WALTER H. MILLER.
ALEXANDER N. PIERMAN.

Witnesses:

MINA C. MACARTHUR,
FRANK L. DYER.



E. R. JOHNSON.
TALKING MACHINE.
APPLICATION FILED SEPT. 25, 1901.

2 SHEETS—SHEET 1.

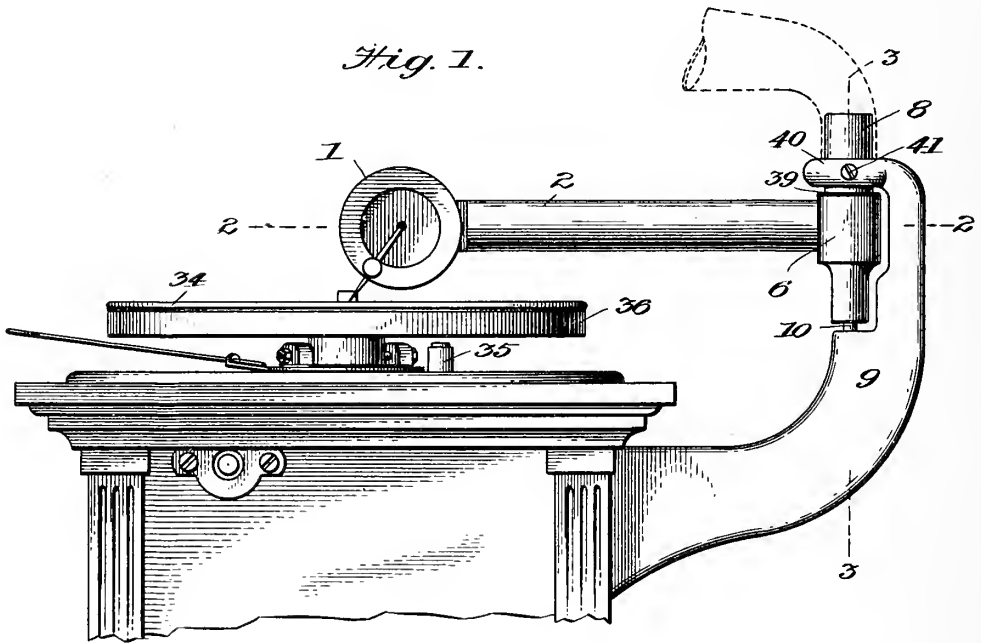


Fig. 3.

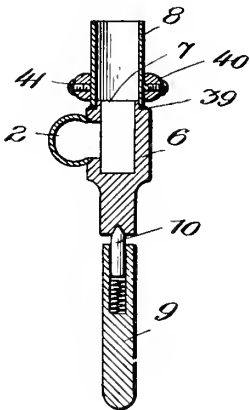


Fig. 2.

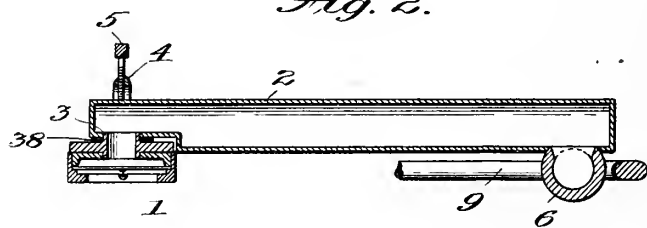
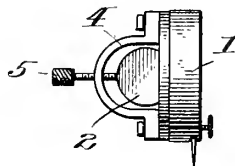


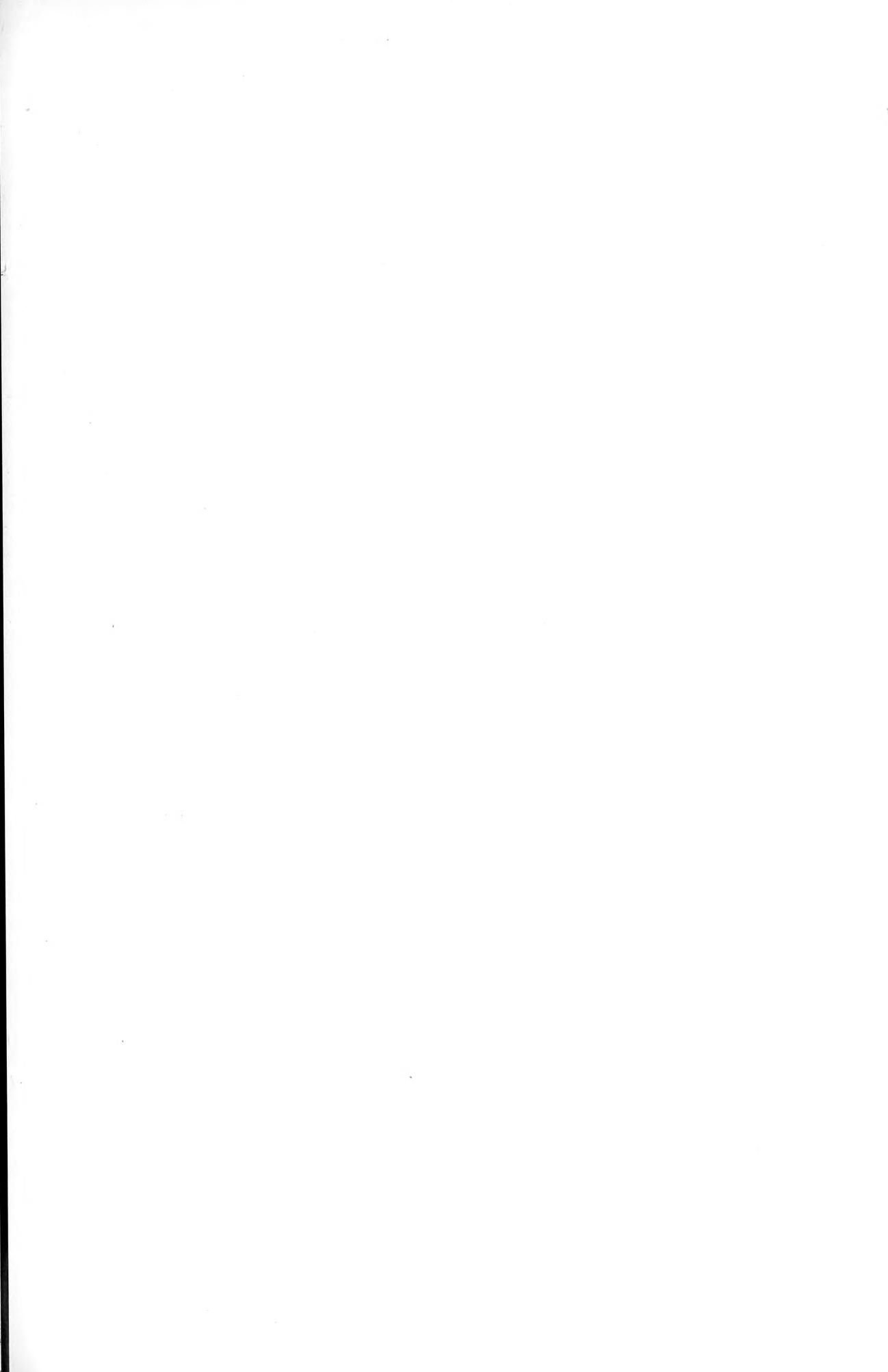
Fig. 4.



Witnesses:

Jno. F. Cross.
J. Henderson.

Inventor,
Eldridge R. Johnson
by Homer Pettis,
his Attorney.



E. R. JOHNSON.
TALKING MACHINE.
APPLICATION FILED SEPT. 25, 1901.

Fig. 5.

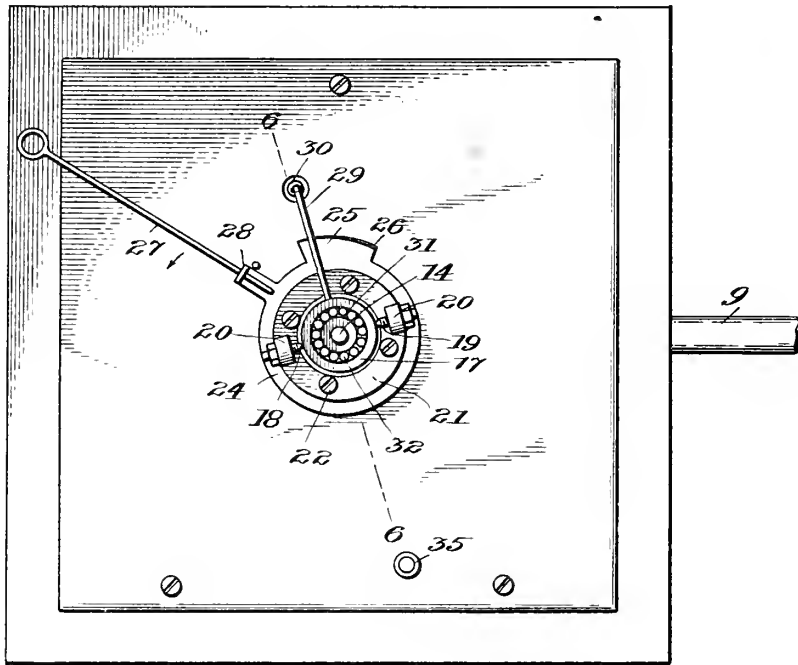
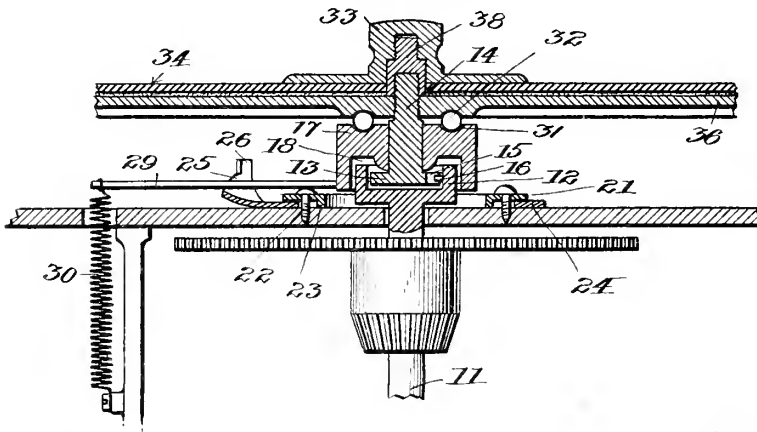


Fig. 6.



Witnesses.
Jno. T. Cross.
J. Henderson.

Inventor.
 Eldridge R. Johnson
 by *Wm. B. Peck,*
 his Attorney

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 785,362, dated March 21, 1905.

Application filed September 25, 1901. Serial No. 76,443.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to certain improvements in talking-machines, and more particularly to the type wherein the flat record-disks are employed.

The objects of my invention are to generally improve the construction of this class of machines with the view of obtaining clearer and more perfect reproductions and increasing or amplifying the sound-waves transmitted from the sound-box or reproducing device.

With these objects in view my invention resides mainly in providing a rigidly-mounted hollow reproducing-arm capable of a lateral movement, having the sound-box rigidly secured to the free end of said arm and having a sound-conveying tube secured to the other end of the arm which is connected with a rigidly-mounted horn, the said horn being supported independently of the reproducing-arm, thereby taking the weight of the same off of the reproducer and its stylus.

My invention further resides in providing improved mechanism for yieldingly mounting the turn-table or record-support and in providing means for throwing and keeping the record-tablet in yielding contact with the stylus during the reproduction, also in providing means for removing the said record from its contact with the stylus and simultaneously stopping the operation of the machine.

In machines of this character where the horn is secured directly to the sound-box and supported by the sound-box-carrying arm a portion of the weight of said horn is thrown on the stylus-point, which unless the arm and horn be very nicely adjusted will hurt the quality of the reproduction by causing harsh and grating sounds. This increased weight

also causes the record-grooves to wear out more quickly, and thus lose their effectiveness, and, further, in such a construction if it is desired to use a larger horn a longer reproducer-arm must be provided, and consequently a longer supporting-bracket. In my improved construction, as herein set forth, these difficulties are entirely obviated, as the weight of the horn is supported entirely upon the bracket which supports the reproducer-arm, and any-sized horn may be used without in any manner affecting the operation of the reproducing mechanism.

My invention is thoroughly illustrated in the accompanying drawings, in which -

Figure 1 is a side elevation of a talking-machine embodying my improvements, the lower portion of the motor-casing being broken away. Fig. 2 is a section taken longitudinally through the carrying-arm about on the line 2 2 of Fig. 1. Fig. 3 is a vertical section taken on the line 3 3 of Fig. 1. Fig. 4 is an end view of the carrying-arm, showing the sound-box and the manner of securing it to said arm. Fig. 5 is a plan view with the turn-table and reproducing mechanism removed. Fig. 6 is an enlarged sectional elevation taken about on the line 6 6 of Fig. 5, the greater part of the motor mechanism being omitted.

Referring more particularly to the sound-conveying mechanism which is shown in Figs. 1 to 4, inclusive, 1 designates the sound-box or reproducing device, which may be of any of the well-known constructions. The supporting-arm 2 comprises a hollow tube closed at both ends, having an opening in its forward end adapted to receive a boss 3, which is formed in the frame of the sound-box. The sound-box is secured firmly in front of this opening by any effective means, but preferably by means of a stirrup 4, which passes around the end of the tube 2, as shown in detail in Fig. 4. A set-screw 5 passes through a threaded aperture in the stirrup and its end bears against the arm 2, and thereby securely holds the sound-box in its proper position. Adjacent to the outer end of the supporting-

arm 2 is a tubular section 6, closed at its bottom and communicating on one side with the interior passage in the arm 2. The upper end of the section 6 is provided with an annular shoulder which forms a boss 7, which fits into a stationary section 8, secured in the bracket 9. The lower end of the section 6 is provided with a pivot-bearing 10, the said pivot being yieldingly mounted in the bracket 9, as illustrated in Fig. 3 of the drawings, the purpose of this being to provide a yielding bearing which is self-adjustable. To the stationary section 8 is secured the small end of the amplifying-horn, a portion of which is illustrated in dotted lines in Fig. 1. I have found it preferable to have the arm 2 extend slightly beyond the entrance of the opening into the section 6, as better results are obtained from such a construction.

Referring particularly to Figs. 5 and 6 of the drawings, 11 designates the driving-spindle of the motor, which is propelled by the well-known spring-propelled gearing, which it has not been deemed necessary to illustrate. The upper end of this driving-spindle projects through the casing and has formed upon the said projecting end a cup 12, into which loosely fits a circular head 13, formed on the end of a short shaft 14. A slot 15 is provided in the head 12, into which fits a pin 16, carried by the inner wall of the cup 12, so that the said shaft 14 will revolve with the driving-spindle 11. A circular hub 17, having an annular recess 18 formed in its lower end, fits loosely over the top of a cup 12, and is provided with a central aperture through which the short shaft 14 passes. This hub 17 is supported on two oppositely-disposed pivot-bearings 18 and 19, which are set transversely or substantially transversely to the line of travel of the stylus-point during the lateral movement of the reproducer-supporting arm. These pivot-bearings 18 and 19 are threaded through lugs 20, formed on a ring 21, which is secured to the motor-casing by means of the screws 22. It will thus be seen that the hub 17 is capable of a swinging movement in a direction transversely to its pivotal axis. The ring 21 has provided on its inner peripheral edge a downwardly-projecting flange 23, which bears against the motor-casing, thus leaving an annular space under said ring into which is fitted a ring 24, which is provided with a cam portion 25, which is curved upwardly from the surface of the ring, as shown in Fig. 6. A projection 26 is formed at the upper end of the cam, which limits the movement of the ring 24 when it is turned by the handle 27. This handle 27 is secured to an upturned lip 28, formed on the said ring 24, and is of a length sufficient to extend beyond the periphery of the turn-table, so it can be easily reached by the operator. Extending from the hub 17 in a line at right angles to its pivotal axis is an arm 29, having its outer

free end secured to a coiled spring 30, which is secured to the machine-casing. This arm 29 normally rests in a substantially horizontal plane and bears against the lower edge of the upwardly-turned cam 25, this normal position being shown in Fig. 6. The upper surface of the hub 17 is provided with a ball-race 31, adapted to receive a set of balls 32. The lower side of the turn-table is also provided with a ball-race which fits over the said balls when the turn-table is in position on the short shaft 14. A threaded nut 38 is screwed over the upper end of the shaft 14 after the turn-table is placed in position, which draws the said shaft up slightly, so as to bring the bottom surface of the head 13 slightly away from and out of contact with the cup-socket 12. A cap 33 may be threaded over the end of the nut 38 for the purpose of firmly securing the record 34 on its supporting-table. A boss 35 is secured to the motor-casing directly under the outer edge of the turn-table and about in line with the arm 29, as shown in Fig. 1. The upper end of this boss is provided with a leather teat, which will contact with the turn-table when the same is tilted to remove the record from contact with the stylus-point.

In operation the stylus-point is in contact with the grooves of the record when the parts are in the position shown in Figs. 5 and 6, the spring 30 having a tendency to pull down on the free end of the arm 29, which brings that portion of the record under the stylus-point in constant but yielding contact with said stylus-point. After the reproduction has been completed the handle-arm 27 is moved in the direction of the arrow shown in Fig. 5, and the cam 25, bearing against the under side of the arm 29, raises the said arm, which tilts the hub 17 and the turn-table 36 and removes the record from contact with the stylus-point. This tilting movement also throws the lower edge of the turn-table into contact with the projecting boss 35, thereby stopping the revolution of the turn-table. In starting again the arm 2 is moved until the stylus-point is directly over the beginning of the record-groove, when the handle 27 is then moved to the left, which allows the arm 29 to drop under the action of the spring 30, which action throws the record into contact with the stylus-point by tilting the turn-table, while at the same time removing the said table out of contact with the brake-boss 35. The shaft 14, which is provided with a circular head 13, adapted to fit loosely in a socket-piece 12, carried by the driving-spindle of the motor, permits of the turn-table yielding slightly in any direction as the bottom of the head 13 is held slightly away from the bottom of the cup or socket 12. The ring 24, which carries the cam 25, fits loosely under the ring 21, the screws 22 serving to center the same.

The passage-way between the sound-box

and the horn is air-tight or sound-proof, a rubber gasket 38 being provided around the opening into which the boss of the sound-box fits, and a gasket 39 being provided around the connection between the tube-sections 6 and 8, so that none of the sound-waves can escape except through the horn. The bracket-arm 9 is provided with a ring 40 at its upper end, into which the stationary section 8 is fitted, the said section being held therein by means of the screws 41.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a talking-machine, the combination a hollow arm limited to move only in a direction parallel to the record, a sound-box fixed to one end of said arm, an amplifying-horn connected with the other end of said arm, and means to allow of a separation of the sound-box and record.

2. In a talking-machine, the combination, a hollow arm pivoted to move only in a direction parallel to the record, a sound-box fixed to one end of said arm, an amplifying-horn connected with the other end of said arm, and means to allow of a separation of the sound-box and record.

3. In a talking-machine, the combination, a hollow arm pivoted at one end to move only in a direction parallel to the record, a sound-box fixed to the free end of said arm, an amplifying-horn connected with the pivoted end of said arm, a record-support and means for withdrawing the record and record-support from the sound-box.

4. In a talking-machine, the combination, a hollow arm pivoted at one end to move only in a direction parallel to the record, a sound-box fixed to the free end of said arm, an amplifying-horn connected with the pivoted end of said arm, a record-support, and means for withdrawing the record and record-support from the sound-box.

5. In a talking-machine, the combination of a hollow arm pivoted at one end to move only in a direction parallel to the record, a sound-box fixed to the free end of said arm, a bracket carried by the machine-casing, a rigid connecting-piece carried by said bracket adapted to communicate with the pivoted end of said arm, and a turn-table separable from the sound-box.

6. In a talking-machine, the combination of a hollow arm pivoted at one end to move only in a direction parallel with the record, a sound-box fixed to the free end of said arm, a bracket carried by the machine-casing, a vertical hollow hub pivotally mounted in said bracket and communicating with the inner end of said arm, a hollow stationary section also carried by said arm and communicating with said hub and means to allow a separation of the sound-box and record.

7. In a talking-machine, the combination of a hollow arm pivoted to move only in a direction parallel to the record, a sound-box fixed to the free end of said arm, a bracket rigidly secured to the machine-casing, a hollow hub carried by said bracket and communicating with the interior of said arm, a stationary tube rigidly secured in said bracket and communicating with said hub, sound-conveying means attached to said tube and means to allow a separation of the sound-box and record.

8. In a talking-machine, the combination of a hollow arm pivoted at one end to move only in a direction parallel to the record, a sound-box fixed to the free end of said arm, a bracket rigidly secured to the machine-casing, a tubular section rigidly secured to said bracket, a hollow hub pivotally mounted in said bracket and connecting with said tubular section and having communication with the interior of said arm, an amplifying-horn pivotally connected to said tubular section and means to allow of the separation of the reproducer and record.

9. In a talking-machine, the combination of a hollow arm pivoted at one end to move only in a direction parallel to the record, a sound-box fixed to the free end of said arm, a bracket carried by the machine-casing in which the inner end of the hollow arm is pivoted, a tubular section carried by said bracket, and a part telescoping with said tubular section and having communication with the interior of the hollow arm, and an amplifying-horn carried by said tubular section and means for holding the record in yielding contact with the sound-box and allowing the same to be separated from the sound-box.

10. In a talking-machine, the combination of a hollow arm closed at both ends and pivotally mounted to move in a direction parallel with the record and having an opening adjacent its free end, a sound-box mounted on the free end of said arm and having communication with said opening, a hollow hub secured adjacent the pivoted end of said hollow arm and having communication with the interior thereof, a support in which said hub is vertically pivoted, a fixed tube carried by said support and telescoping with said hub, means for holding said hub in telescoped relation with said tube, a horn pivotally carried by said tube and means to allow separation of the sound-box and record.

11. In a talking-machine, the combination of a hollow arm, a sound-box connected to one end thereof, a vertical hollow hub connected to the opposite end thereof, a fixed support, a vertical tube carried by said support, and spring-actuated means for keeping said hub in operative connection with one end of said tube.

12. In a talking-machine, the combination with a rigidly-mounted reproducer, of a yield-

ingly-mounted record-support, a hub pivotally mounted on the machine-casing, a driving-shaft having a cup-shaped top, a stub-shaft having an enlarged head adapted to fit loosely in the cup portion of the driving-shaft, the said stub-shaft passing through the pivoted hub, means for connecting the stub-shaft head with driving-shaft so as to revolve therewith, and a nut adapted to the end of the stub-shaft for clamping the record-support thereto, substantially as described.

13. The combination with a vertically-rigid reproducer of a revolving driving-spindle, an enlarged head formed on the upper end of said spindle having a socket formed therein, a hub-piece adapted to fit loosely over the head, pivotal bearings carried by the machine-frame in which the hub-piece is mounted, a stub-shaft passing through the hub, a head formed on said shaft adapted to fit loosely in the socket of the driving-spindle, means for coupling the said head to the driving-spindle head, a turntable secured on the upper end of the stub-shaft, ball-bearings between the turn-table and

the hub-piece, and means for tilting the hub-piece, for the purpose described.

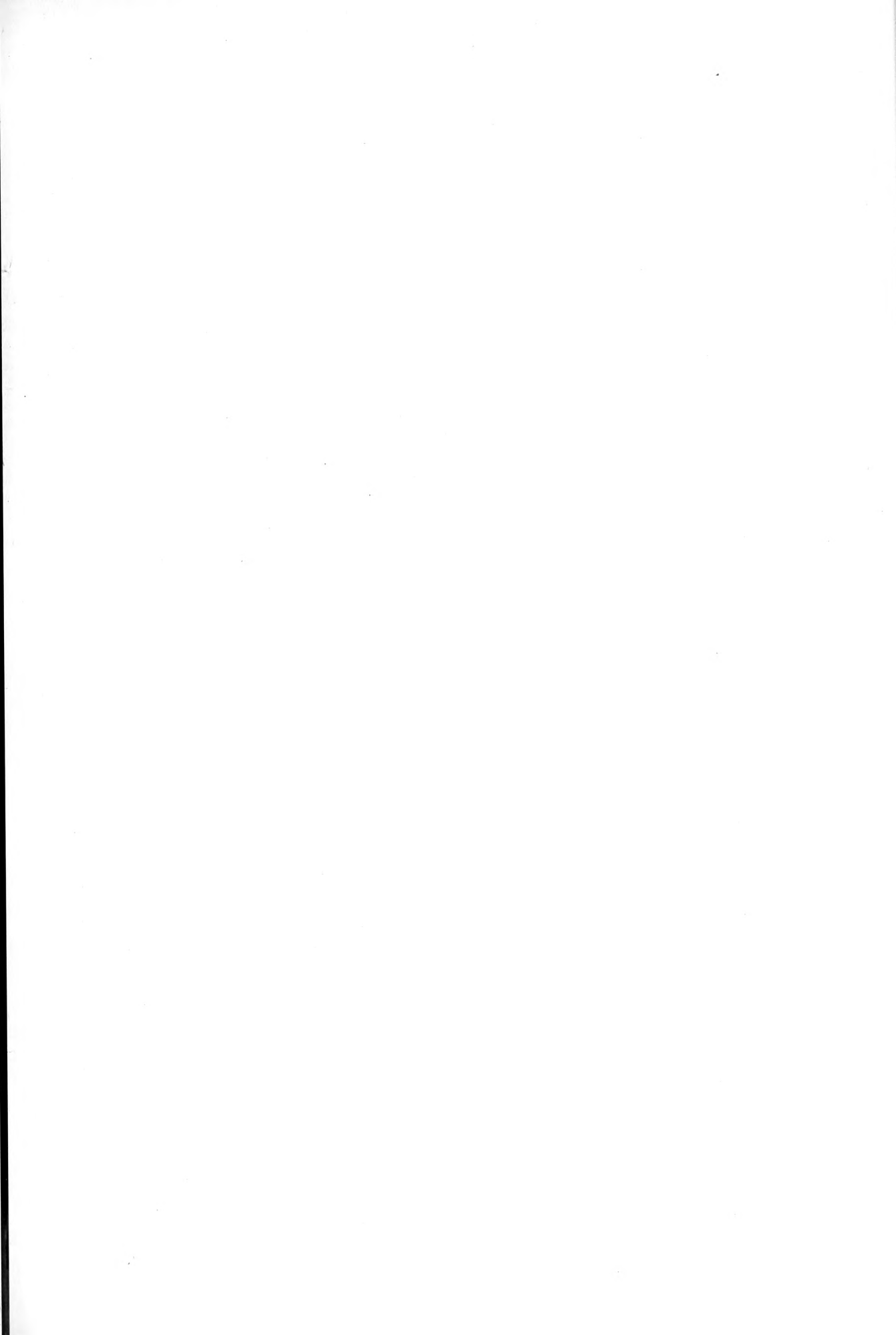
14. The combination with a vertically-rigid reproducer the driving-spindle having a socket formed in its upper end, a hub-piece pivotally mounted on the machine-casing over the driving-spindle socket, a stub-shaft passing through said hub, an enlarged head formed on the end of the stub-shaft adapted to the socket in the driving-spindle, a coupling-pin between the stub-shaft and driving-spindle, a turn-table secured on the upper end of the stub-shaft, an arm secured to the pivoted hub and extending radially therefrom, a spring for holding said arm down, and a cam located adjacent the arm, adapted to act on the same to raise said arm and tilt the turn-table, substantially as described.

In witness whereof I have hereunto set my hand this 24th day of September, A. D. 1901.

ELDRIDGE R. JOHNSON.

Witnesses:

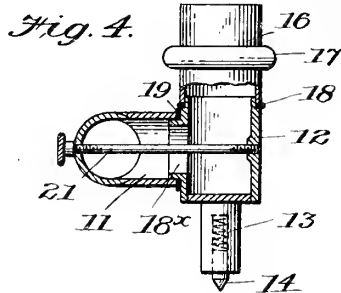
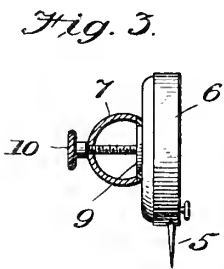
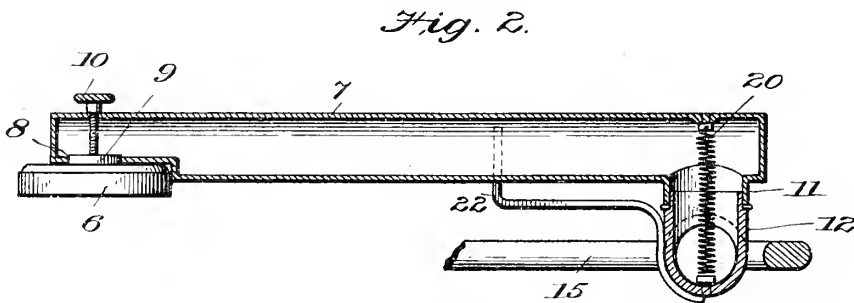
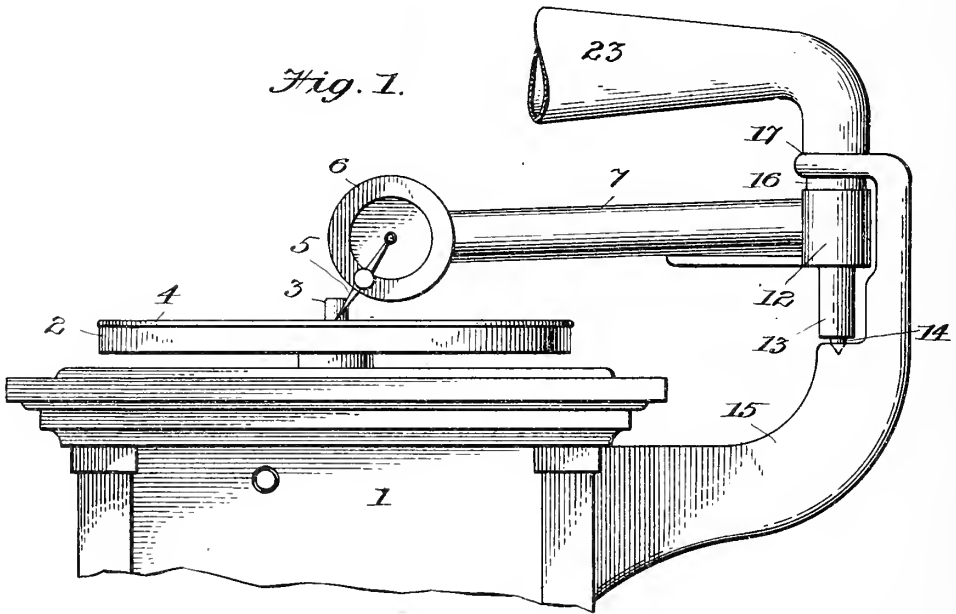
CHARLES H. SPECKMAN,
J. HENDERSON.



No. 785,363.

PATENTED MAR. 21, 1905.

E. R. JOHNSON.
TALKING MACHINE.
APPLICATION FILED SEPT. 18, 1903.



Witnesses:
Jno. T. Cross.
Chas. Bennett.

Inventor,
Eldridge R. Johnson.
by *Wm. Pettit,*
his Attorney.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 785,363, dated March 21, 1905.

Application filed September 18, 1902. Serial No. 123,865.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention has reference to certain improvements in talking-machines of the flat-record type, and has for its object to generally improve and simplify the construction of devices of this character in such manner as to increase both the volume and character of the reproductions and render the tones clearer, sweeter, and more distinct.

With these ends in view my invention consists in the structure substantially as herein described and illustrated, and particularly set forth in the appended claims.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a side elevation of a talking-machine embodying my improvements. Fig. 2 is a sectional plan taken longitudinally through the reproducer-arm. Fig. 3 is a cross-section through the forward end of the arm, showing the connection with the sound-box; and Fig. 4 is a cross-section through the swivel-joint at the other end of the arm, showing a modified form of means for holding the two sections together.

Referring particularly to the said drawings, 1 designates the motor-casing, and 2 the turn-table, which is driven by a spindle 3, connected with the motor mechanism in the usual manner. The turn-table 2 carries the usual flat disk record 4, having the spirally-arranged record-groove provided thereon, which is engaged by the stylus-point 5 of the sound-box 6.

The sound-box-supporting arm 7 comprises a tubular section closed at both ends, having an opening 8 adjacent its forward end on one side of the said tube adapted to receive the boss 9, carried by the sound-box 6. The sound-box may be secured to the arm 7 by means of

a set-screw 10, which passes through the said arm and has its end threaded in an aperture provided in a bridge running across the boss 9. The rear end of the arm 7 is provided with a short tubular section 11, which opens into the side of the arm 7 at a point slightly to one side of the end of the arm. A tubular section 12, closed at its lower end and having an extension 13 provided on its under side, which carries a spring-pressed pivot 14, is pivotally mounted in the stationary bracket 15, which is carried by the sound-box casing. The section 12 is telescoped into a short section of tubing 16, which is rigidly held in an aperture formed in the arm 17 of the bracket 15. A shoulder 18 is formed on the section 12 at the point where it bears against the lower portion of the section 16, and a rubber gasket is interposed between these two sections for the purpose of rendering the same sound-proof.

Extending from the side of the section 12 is a boss 18^x, having a shoulder formed adjacent its ends, and the end of this boss fits into the end of the tubular section 11, which is connected with the arm 7. A washer 19 is interposed between these two sections for the purpose of rendering the connection sound-proof. In order to hold the section 12 and the section 11 together, I provide a small coiled spring 20, which is secured at one end to the interior of the tubular arm 7 and at its other end to the outer interior wall of the section 12. Instead of using the yielding connection 20 for holding these parts together a thin set-screw 21, such as shown in Fig. 4 of the drawings, may be used with equally good result.

Secured to the lower portion of the vertically-disposed section 12 is an arm 22, which extends under the tubular arm 7 and serves to limit the downward movement of the arm when its reproducing mechanism is removed from contact with the record. The short tubular section 16 extends a certain distance above the arm 17 of the bracket 15, and to this section is fitted the horn 23 in such a manner that the said horn may be swung around in any direction desired. It will be noted from this construction that the entire weight

of the horn is supported by the bracket-arm, so that any-size horn may be used on machines of this construction without increasing the weight of the reproducer-supporting arm.

5 This construction of machine is designed for use with rigidly-mounted turn-tables, and a double swivel-joint is necessary in order to permit the arm 7 to move both laterally and vertically. By my above-described construction
10 I find that the sounds transmitted from the diaphragm to the horn are greatly amplified and that the tone and quality of the reproduction is much clearer and more distinct than in the old construction of talking-machines, wherein the horn was connected
15 directly to the sound-box. This I attribute partly to the fact that the hollow arm 7 is rigid throughout its entire length, and consequently there is no twisting to this arm caused by the
20 weight of the horn and no false vibrations, as in the case of the wooden arm heretofore used.

Minor details in construction may be made without departing from the spirit and scope of my invention. For instance, the manner in
25 which the long arm 7 is swiveled to the transversely-disposed short section 12 might be altered and any other suitable swiveled connection substituted therefor, and, further, the
30 means for holding the sound-box to the arm 7 might be changed and any other suitable means substituted therefor, and various other modifications might be made.

What I claim, and desire to secure by Letters Patent, is—

35 1. In a talking-machine, the combination of a continuous hollow arm, a sound-box attached to one end thereof, a transverse hub connected at one side of the other end of said arm, there
40 being a swivel-joint between said hub and arm.

2. In a talking-machine, the combination in reproducing mechanism of a continuous hollow arm provided at one end with a sound-box,
45 and at its other end with a short transverse tube having a swivel-joint therein, said tube being pivoted on a transverse axis and adapted to communicate with sound-conducting means.

3. In a talking-machine, the combination in reproducing mechanism of a continuous hollow arm provided at one end with a sound-box,
50 a hollow hub or member adapted to turn about an axis at right angles to the hollow arm and means connecting the end of said hollow arm opposite to the sound-box with said hollow
55 member and including a swivel-joint to permit a movement of the sound-box about an axis transverse to that of the hollow hub or member.

4. In a talking-machine, the combination in reproducing mechanism of a continuous hollow arm provided at one end with the sound-box and at its other end a pivoted transverse

hub there being a swivel connection between said hub and arm and affording a continuous closed sound-conducting passage between said
65 sound-box and hub.

5. In a talking-machine, the combination with the record, of a reproducing mechanism comprising a hollow tubular arm rigid throughout its length and closed at both ends,
70 an opening in the side of said arm adjacent its rear end, a swivel connection between said opening and the pivoted tubular section, a support for said pivoted tubular section, and a sound-box connected with the interior of the
75 tubular arm adjacent its forward end, substantially as described.

6. The combination in a talking-machine, of a rigid tubular arm closed at both ends having an opening in the side thereof adjacent its
80 rear end, a transversely-disposed short tubular section pivoted in a support so as to move on a vertical axis, a tubular connection between the tubular arm and the short section, a swivel-joint provided in said tubular connection,
85 and a sound-box connected with an opening in the side of the tubular arm adjacent its front end, substantially as described.

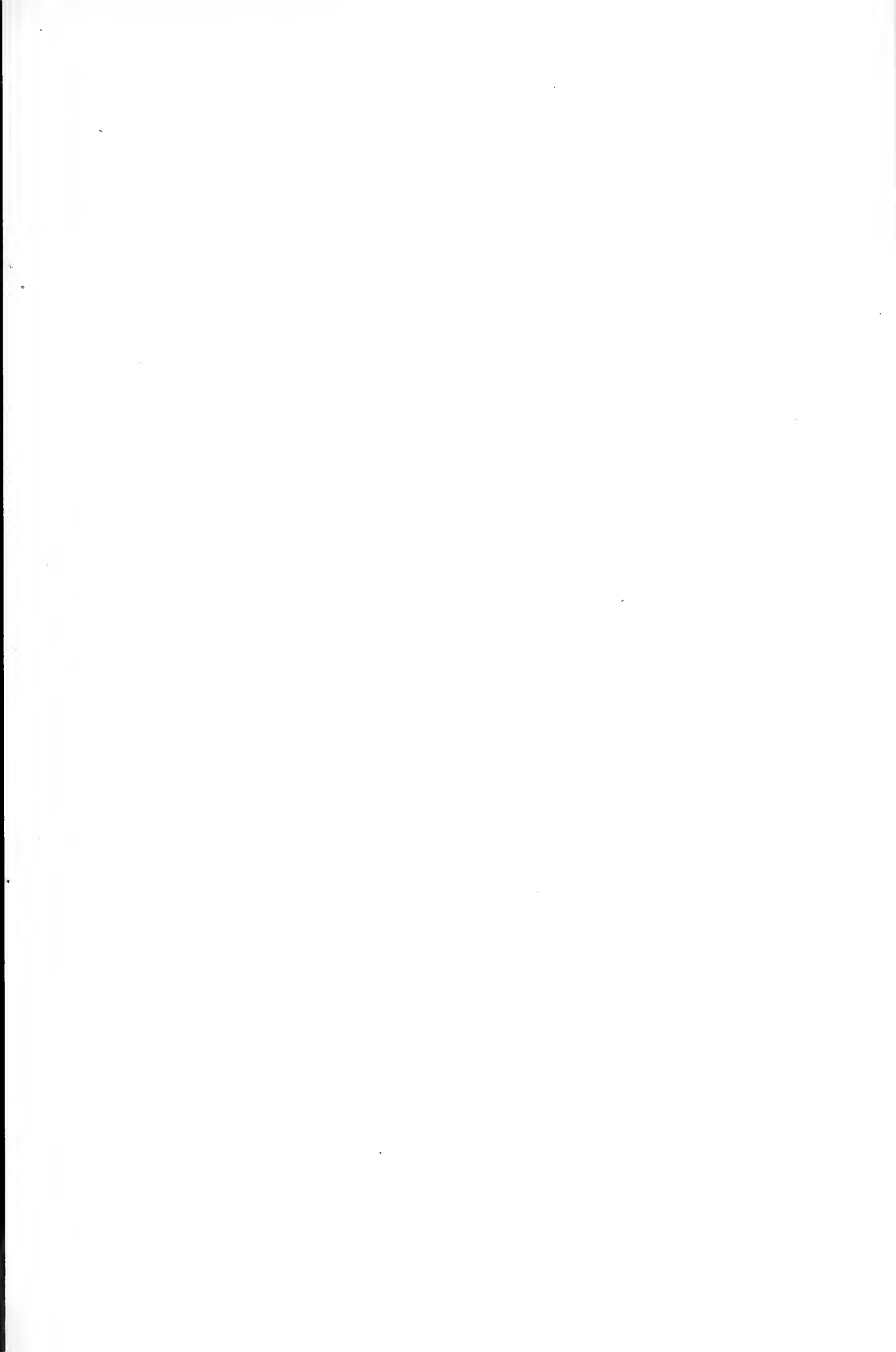
7. The combination in a talking-machine, of a rigid tubular arm closed at both ends having an opening in its side adjacent its rear end,
90 a transversely-disposed short tubular section pivoted in a support so as to move on a vertical axis, a tubular connection between the tubular arm and the short section, a swivel-joint provided in said tubular connection so as
95 to permit of a substantially vertical movement to the tubular arm, means for holding the two sections together, and a sound-box connected to an opening formed in the side of the tubular arm adjacent its front end, substantially as described.
100

8. The combination with a talking-machine of a continuous tubular arm closed at both ends and having an opening in its side adjacent its
105 rear end, a short tube or flange surrounding said opening, a transversely-disposed hollow hub pivoted in a support to move on an axis transverse to said arm and having an opening in the side thereof, said opening being surrounded by a short tube or flange which is adapted to telescope with the flange on said arm so as to permit of a movement of said arm on an axis at right angles to the axis of said hub, a spring for holding the two short
110 tubes or flanges in telescoped relation and a sound-box connected with the outer end of said hollow arm.

In witness whereof I have hereunto set my hand this 17th day of September, A. D. 1902.
120 ELDRIDGE R. JOHNSON.

Witnesses:

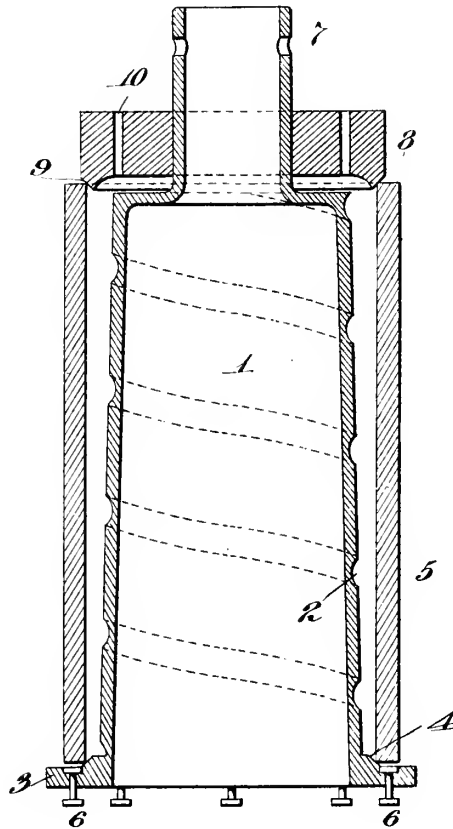
HORACE PETTIT,
JNO. T. CROSS.



No. 785,510.

PATENTED MAR. 21, 1905.

W. H. MILLER & A. N. PIERMAN.
MOLD FOR DUPLICATE PHONOGRAPH RECORDS.
APPLICATION FILED FEB. 26, 1903.



Witnesses:

Jas. F. Coleman
Geo. Robt Taylor

Inventors

Walter H. Miller
Alexander S. Pierman
by *Robert H. Owen*
Attorneys

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNORS, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MOLD FOR DUPLICATE PHONOGRAPH-RECORDS.

SPECIFICATION forming part of Letters Patent No. 785,510, dated March 21, 1905.

Application filed February 26, 1903. Serial No. 145,189.

To all whom it may concern:

Be it known that we, WALTER H. MILLER, residing at Orange, and ALEXANDER N. PIERMAN, residing at Newark, in the county of Essex and State of New Jersey, both citizens of the United States, have invented a certain new and useful Improvement in Molds for Duplicate Phonograph-Records, of which the following is a description.

Our invention relates to an improved mold for making duplicate phonograph-records, preferably of the type described in Letters Patent No. 726,966, dated May 5, 1903, wherein the wax or wax-like material is intimately associated with a fibrous material throughout its mass. The mold may, however, be employed for producing duplicate phonograph-records composed of a wax or wax-like material throughout or for the manufacture of blanks. In Letters Patent No. 726,965, dated May 5, 1903, we describe an improved process for making duplicate phonograph-records in which a mold is used having a core concentrically arranged therein, the wax or wax-like material in molten condition being introduced upwardly into the space between the mold and core. Some difficulty has been experienced in practice with this apparatus, as sometimes the mold is accidentally shifted radially with respect to the core, so that the bore of the resulting duplicate is somewhat eccentric with respect to the record-surface.

The essential object of the present invention, therefore, is to provide a mold in which the core will during the setting or cooling of the material be maintained exactly concentric to the mold, so as to thereby overcome the objection pointed out.

To this end the invention consists in providing the core with an inclined shoulder which is engaged by the bottom edge of the mold and in utilizing a separate heading-disk for engaging the core and provided with an inclined shoulder which engages the upper end of the mold, whereby the mold will auto-

matically be centered with respect to the core during the cooling of the material.

In order that the invention may be better understood, attention is directed to the accompanying drawing, forming a part of this specification, and in which we illustrate a sectional view of the preferred manner of carrying our invention into effect.

The core 1 is hollow and is preferably formed with a spiral groove 2, so as to permit it to be readily removed from the finished duplicate, as well as to form a spiral rib on the latter for engagement with the mandrel of the phonograph. The core is formed with a base 3, having an inclined shoulder 4, with which the inner bottom edge of the mold 5 engages. This mold is made in any suitable way and carries a negative representation of the record on its bore. If the apparatus is to be used for molding blanks, the mold is provided with a smooth bore. A series of headed pins 6 are mounted in the base 3, as we describe in our said Patent No. 726,965, for supporting the mold, the arrangement being such that when the parts are assembled and introduced into a tank containing a molten wax-like material the pins will elevate the mold to permit the wax-like material to enter the space between the mold and core. The upper portion 7 of the core is made cylindrical and receives a heading-disk 8, formed with an inclined shoulder 9, which engages the inner edge of the upper end of the mold, as shown. This heading-disk may be provided with one or more vents 10 to permit of the escape of air from the space between the mold and core.

In operation the mold is first inserted over the core and the heading-disk 8 engaged with its upper end. The mold and core are now introduced into the molten material, and the pins 6 will elevate the mold to permit the molten material to enter the space between the mold and core. If practically indestructible duplicates are to be produced, as we describe in our Patent No. 726,966, a mass of fibrous

material, such as cotton-wool, is first loosely wound around the core, so that the molten wax-like material will thoroughly impregnate the same. When the space between the mold

5 and core has been filled to the proper height with the molten wax-like material, the parts are removed by a suitable bail applied to the core, thus permitting the mold to descend until the inner edge of its lower end engages the
10 shoulder 4, so as to prevent the escape of the material. The heading-disk 8 also descends and by its engagement with the upper end of the mold effectively centers the same. As soon as the material has sufficiently cooled
15 the heading-disk is removed, the core unscrewed from the resulting duplicate, and the latter is then contracted by further cooling until it may be removed from the mold.

Having now described our invention, what we claim is—

1. In apparatus of the character described, the combination with a cylindrical one-piece metal mold, of a core within the same having a tapered shoulder upon which one edge of
25 the mold rests, loosely engaging the same, substantially as set forth.

2. In apparatus of the character described, the combination with a cylindrical one-piece metal mold, of a core within the same having
30 a tapered shoulder upon which the inner edge of the mold rests, loosely engaging the same, substantially as set forth.

3. In apparatus of the character described, the combination with a cylindrical mold, of a
35 core within the same having a tapered shoulder

with which one edge of the mold engages, and a heading-disk carried by the core having an inclined shoulder for engaging an opposite edge of the mold, substantially as set forth.

4. In apparatus of the character described, 40 the combination with a cylindrical mold, of a core within the same having a tapered shoulder with which one of the inner edges of the mold engages, and a heading-disk carried by the core having an inclined shoulder for engag- 45 ing the opposite inner edge of the mold, substantially as set forth.

5. In apparatus of the character described, the combination with a cylindrical mold, of a core having an inclined shoulder with which 50 one of the edges of the mold engages, and a series of pins for moving the mold longitudinally with respect to the core, substantially as set forth.

6. In apparatus of the character described, 55 the combination with a cylindrical mold, of a core having an inclined shoulder with which one of the edges of the mold engages, a series of pins for moving the mold longitudinally with respect to the core, and a heading-disk 60 carried by the core having an inclined shoulder for engaging an opposite edge of the mold, substantially as set forth.

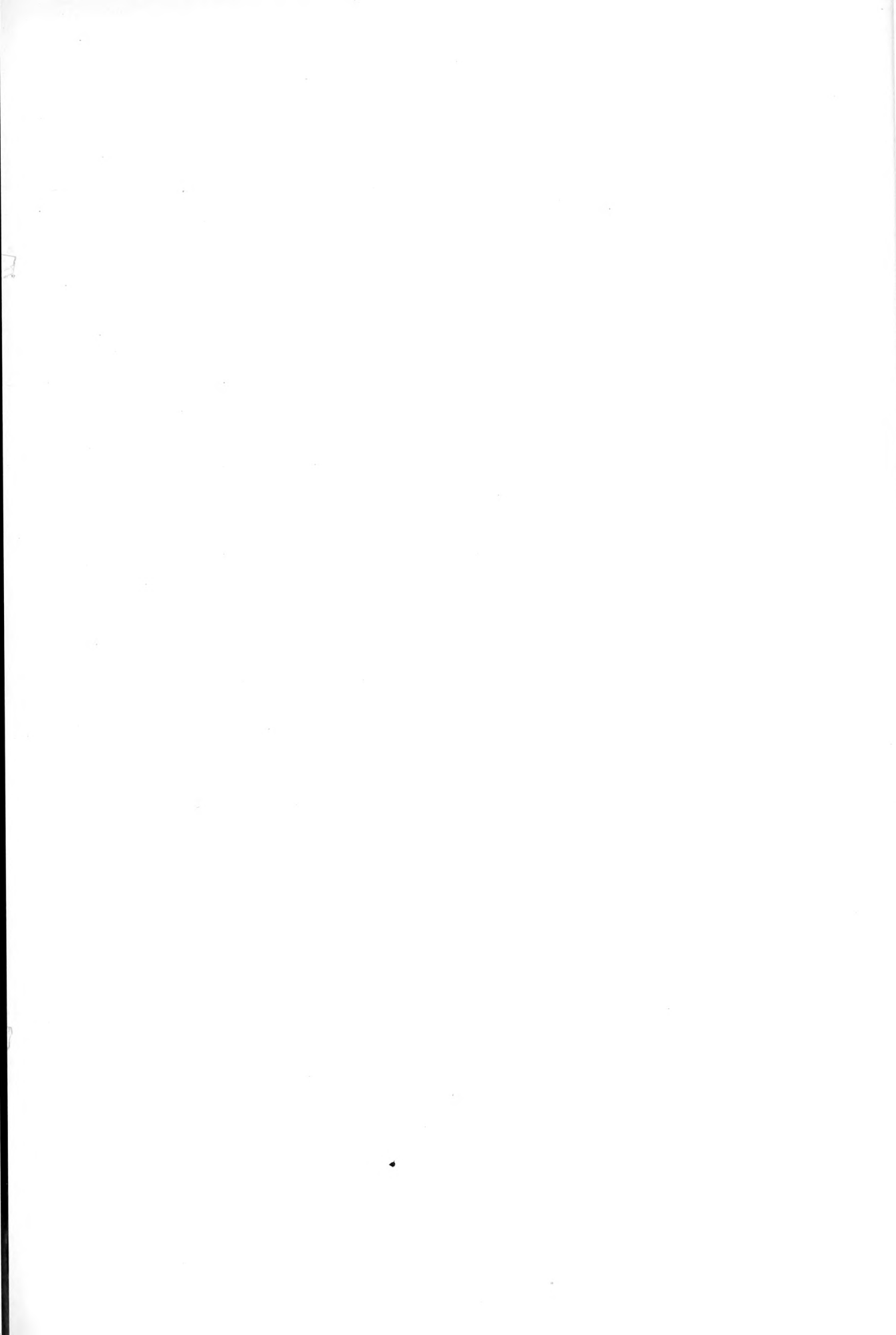
This specification signed and witnessed this 24th day of February, 1903.

WALTER H. MILLER.

ALEXANDER N. PIERMAN.

Witnesses:

JNO. ROBT. TAYLOR,
JOHN LOUIS LOTSCH.



No. 785,723.

PATENTED MAR. 28, 1905.

V. H. EMERSON.
GRAPHOPHONE REPRODUCER.
APPLICATION FILED SEPT. 7, 1904.

Fig. 1.

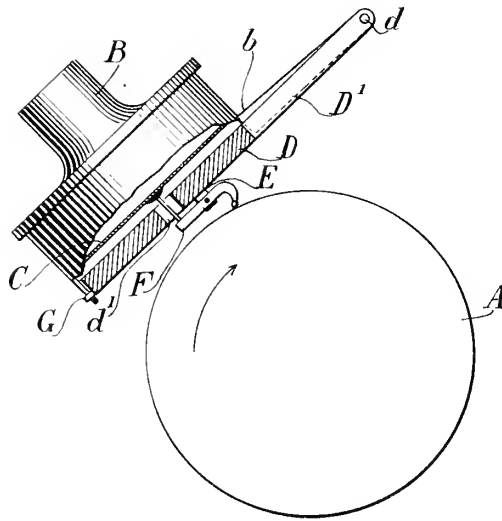
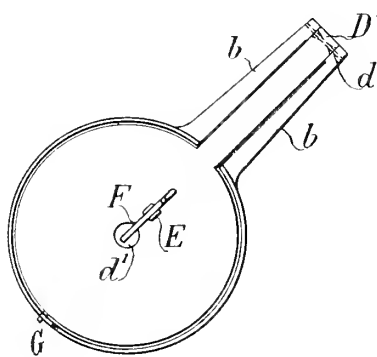


Fig. 2.



Witnesses:
Raphaël Ketter
Wm. B. Kerkham

Inventor:
Victor H. Emerson
by *Mauro, Cannon, Lewis & Massie*
Att'ys.

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE-REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 785,723, dated March 28, 1905.

Application filed September 7, 1904. Serial No. 223,648.

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, a citizen of the United States, residing in Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Graphophone-Reproducers, of which the following is a specification.

My invention relates to floating-weight reproducers or "speakers" for graphophones or other talking-machines.

The invention consists in the construction and arrangement of parts, as hereinafter pointed out and claimed; and the object of my invention is to provide a speaker which will give better audible reproductions and which will not wear out the sound-record to any appreciable extent.

The annexed drawings illustrate one embodiment of my invention.

Figure 1 is a side view, partly broken away, showing my improved speaker in operative relation to the record-cylinder; and Fig. 2 is a face view of the speaker.

A represents a cylindrical record which revolves in the direction indicated by the arrow.

B is the main portion or head of the speaker, provided with the ordinary diaphragm C and mounted, as by a carrier or otherwise, so that it may be fed longitudinally along the surface of the record in any well-known manner.

D is the floating weight, shown as a thin plate circular in form and provided with a prolongation or arm D', which latter is pivoted, as at *d*, between two bracket-arms *b b*, that extend from the head B. Between the pivot *d* and the center of the floating weight D is located the pillar E, in which is pivoted the stylus-bar F. The outer end of the stylus-bar F, preferably in the form of a gooseneck, carries the reproducing stylus or jewel, and the inner end of the stylus-bar is connected with the center of the diaphragm C, preferably by a link which passes through the central aperture *d'* in the floating weight.

At G is shown a stop consisting of a staple secured to the head of the speaker and engaging a short pin projecting from the floating weight. The hole through the arm D' where

the pivot *d* passes is tapered at each end, as shown in Fig. 2, to permit a slight lateral play of the floating weight and its parts.

It will be noticed that any tangential pull upon the stylus caused by the revolution of the record A is exerted in a direction toward pivot *d* and that the center of gravity of the floating weight, which is ultimately supported by the stylus resting on the record-groove, is almost at the geometrical center of the floating weight, so that the pressure of this weight is exerted upon the stylus with increased leverage. It will also be noted that so long as the sound-record is absolutely and ideally the perfect cylinder and the mechanism of the talking-machine is ideally perfect and the record-groove a true helix the floating weight is inactive, its only function being to maintain a steady and uniform pressure upon the stylus, but that whenever there is any eccentricity of the cylinder or any departure from the ideal conditions then the mass of the floating weight will either be lifted or will swing down or from side to side. In other words, the center of gravity of this floating weight will be shifted vertically or laterally, or both.

Actual comparisons and tests have demonstrated that audible reproductions by means of my new speaker are far clearer and more natural and certain than the reproductions from the same record by any other speaker now known and that whereas with other speakers the record is practically worn away after a few hundred reproductions, so that the audible reproductions become quite faint and harsh, with my new speaker I have obtained many hundred reproductions from the same record without any appreciable diminution in quality or volume.

I have shown and described the particular construction with some fullness, but merely for the sake of clearness, since I do not limit myself to the precise details herein set forth, and parts of my invention may be used to the exclusion of other parts.

One main idea of my invention consists in pivoting the floating weight at a point beyond its periphery, and of course this may be ac-

complished in many ways. Another idea consists in having the "thrust" (caused by the revolution of the cylinder) toward the pivot of the floating weight instead of a "pull" away from it. This has been found to render the device equally sensitive to the normal irregularities of the record and far more sensitive in tracking the record-groove, and the fact that in my construction this floating weight responds to impulses more sensitively means that its reaction upon the record-surface is less violent than heretofore. Hence the record is not worn away.

Having thus described my invention, I claim—

1. The combination with a sound-box and its diaphragm, of a floating weight pivoted to

said sound-box at a point beyond the peripheries of said box and weight, and a stylus mounted on said weight and connected with said diaphragm. 20

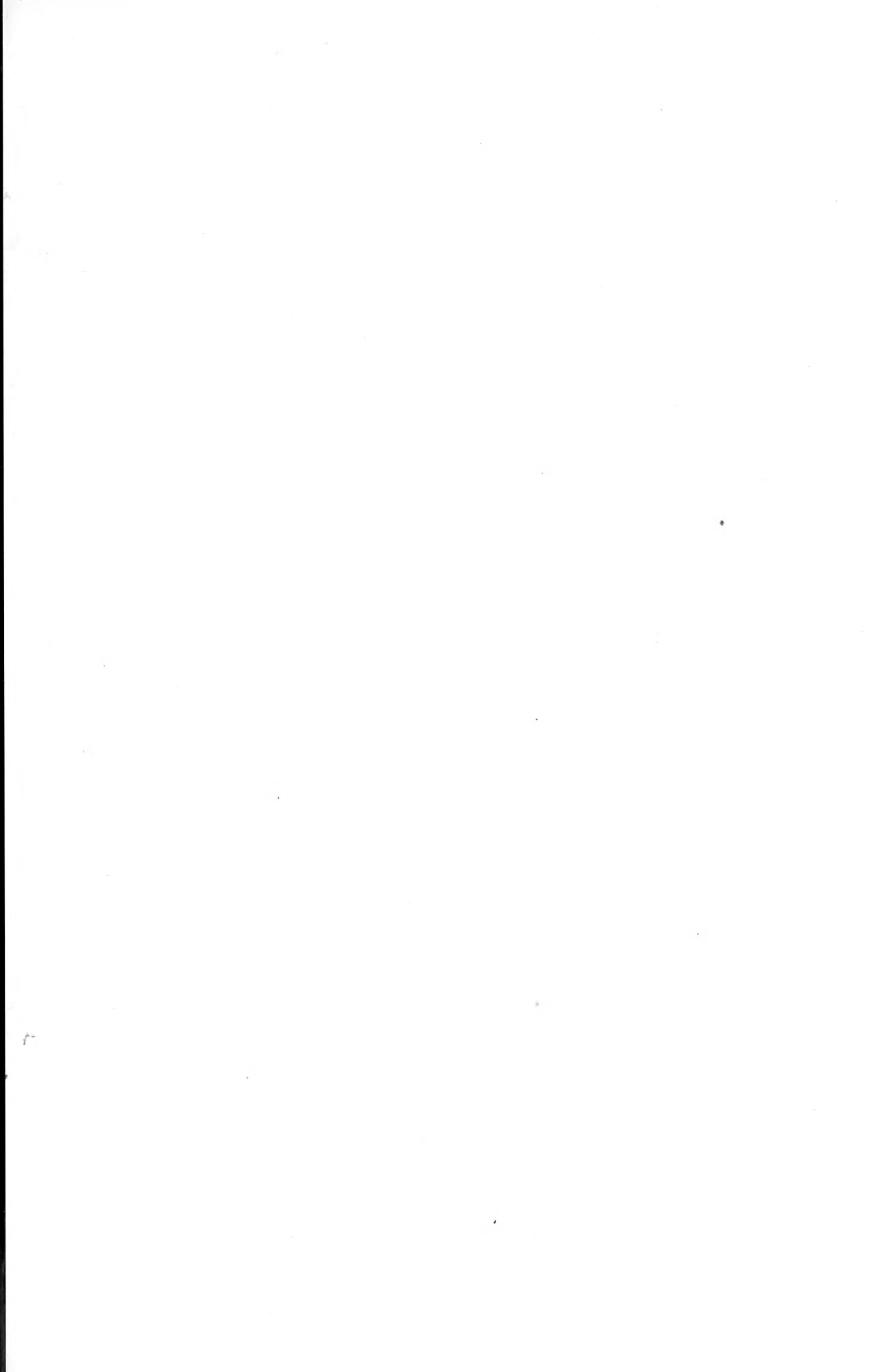
2. The combination with a sound-box and a floating weight pivoted together beyond their peripheries, of a stylus-bar pivoted upon said weight between the geometrical center and the pivot-point of said weight. 25

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

C. A. L. MASSIE,
N. M. KELLER.



No. 785,746.

PATENTED MAR. 28, 1905.

T. H. MACDONALD.
GRAPHOPHONE REPRODUCER.

APPLICATION FILED SEPT. 7, 1904.

Fig. 1.

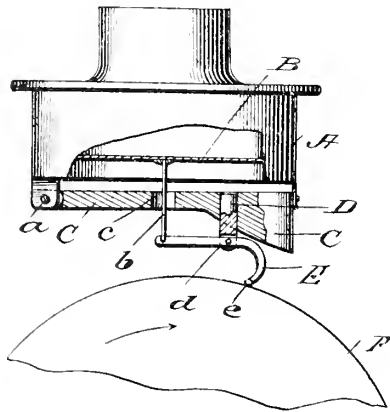


Fig. 2.

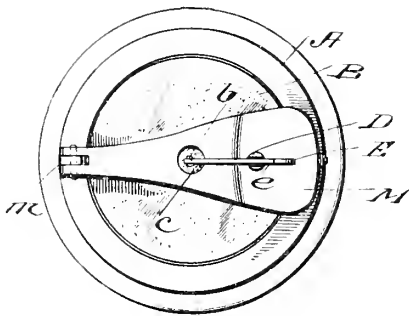
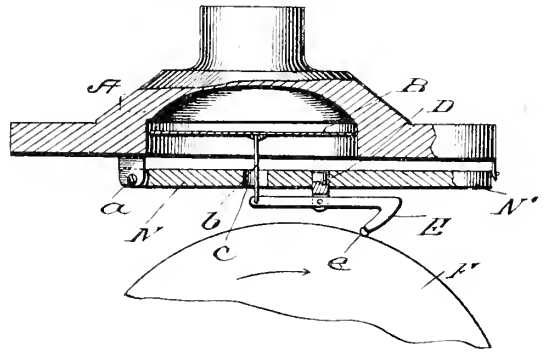


Fig. 3.



Inventor

Thomas H. Macdonald,

by

Mauro, Cameron, Lewis & Massie
Attorneys

Witnesses

Wm. B. Re. Ken

Mustare R. Thompson.

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE-REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 785,746, dated March 28, 1905.

Application filed September 7, 1904. Serial No. 223,649.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States, residing in Bridgeport, Fairfield county, State of Connecticut, have invented a new and useful Improvement in Graphophone - Reproducers, which is fully set forth in the following specification.

My invention relates to a reproducer of the type employing a "floating weight," upon which the stylus-lever is pivoted; and the invention consists in so proportioning this floating weight that its center of gravity shall be practically coincident with the fulcrum of the stylus-lever.

In the annexed drawings are illustrated embodiments of my invention.

Figure 1 is a side view, partly broken away, of one embodiment. Fig. 2 is a bottom view of a modified form, and Fig. 3 is a section of another modification.

A represents the main portion or head of a reproducer adapted for engagement in a suitable seat upon the carrier, which is fed along the sound-record in the usual manner. B indicates the diaphragm thereof.

C is the floating weight, pivoted to the head at *a* and carrying the fulcrum-post D. Upon this post is pivoted the stylus-lever E, between the inner end of which and the diaphragm B is a connection, preferably a link *b*, that passes through a central aperture *c* in the weight C, while the outer end of the stylus-lever (preferably in the form of a gooseneck) carries the stylus *e*. When the floating weight is an ordinary flat circular plate, as commonly used heretofore, its center of gravity will of course be at its geometrical center in the middle of the aperture *c*. Therefore the pressure exerted upon the stylus (which is located beyond the center of gravity) is not equal to the full weight of the floating weight C. According to my present invention I increase the mass of the floating weight at its free end (farthest away from its hinge *a*) by thickening it, as seen at C', Fig. 1, so that its center of gravity shall be practically coincident with the fulcrum D. Consequently the

entire mass or weight of the floating weight may be conceived of as concentrated into this portion D, where the pressure is applied, and the up-and-down movement of the floating weight C is produced through D without any leverage whatever. Therefore every atom of the mass C tends to resist the quick upward blows upon the stylus *e* caused by the minute normal irregularities of the sound-record, while the slower movement imparted by abnormal eccentricities of the cylinder F can more readily overcome the inertia of weight C, because there is no leverage to counteract. If the center of gravity should be carried appreciably beyond the fulcrum D, there would be undue pressure upon the record and more inertia to overcome, which would tend to wear away the record-surface.

Instead of the precise construction of the floating weight just described I may employ an oval or pear-shaped floating weight M, pivoted at its smaller apex *m*, as in Fig. 2, or there may be a prolongation N' of the floating weight N, as in Fig. 3, or there may be other modifications, the essential feature being that the floating weight (of whatever design) must be so constructed and proportioned that its center of gravity shall be practically coincident with the fulcrum of its stylus-lever.

Having thus described my invention, I claim—

1. In a reproducer for graphophones or other talking-machines, a head carrying a diaphragm, a floating weight pivoted to said head, a fulcrum-post located at the center of gravity of said weight, and a stylus-bar pivoted on said post and connected to said diaphragm.

2. A floating weight for reproducers, having a stylus-lever pivoted thereto at the center of gravity of said weight, substantially as described.

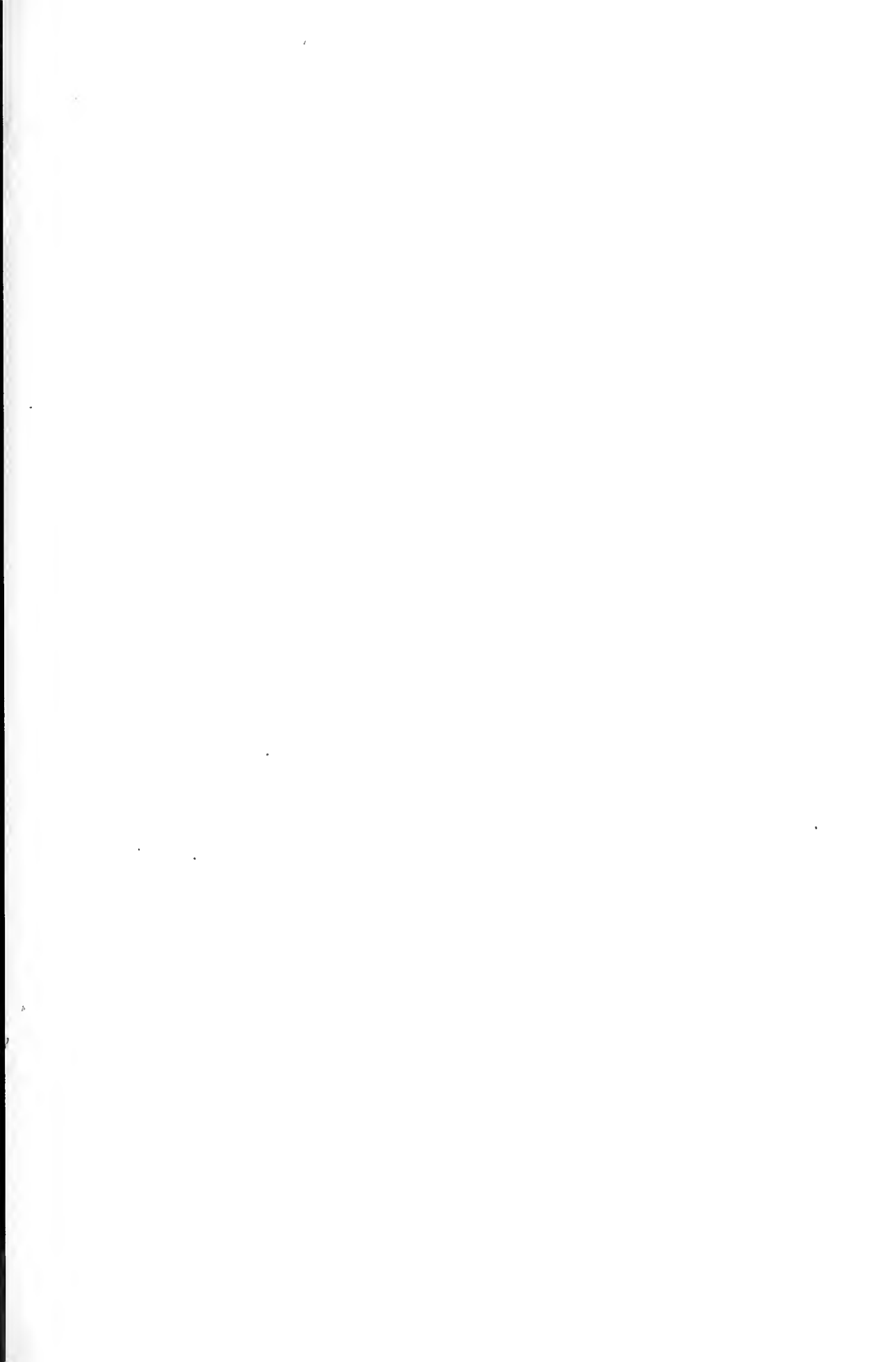
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

C. B. INGALLS,
C. A. GIBNER.





J. SANDERS.
GRAMOPHONE.

APPLICATION FILED DEC. 13, 1904

Fig. 1.

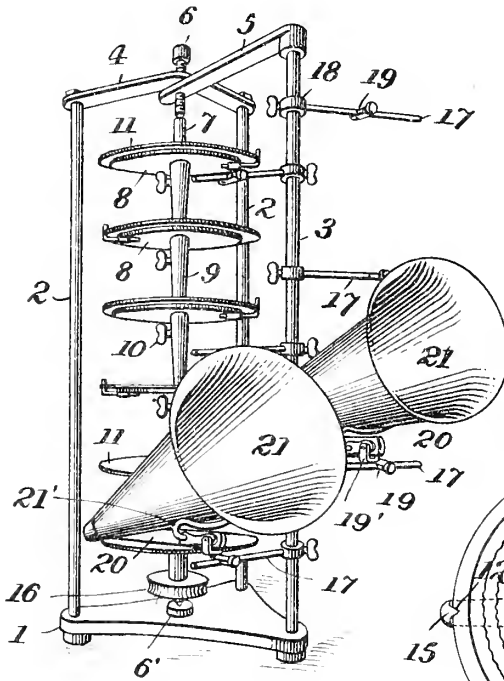


Fig. 4.

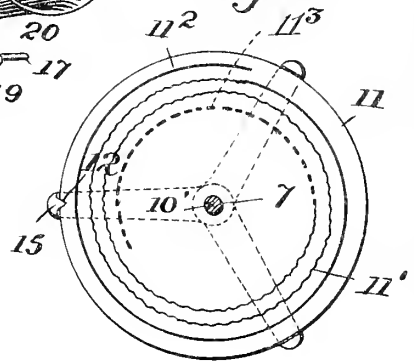


Fig. 2.

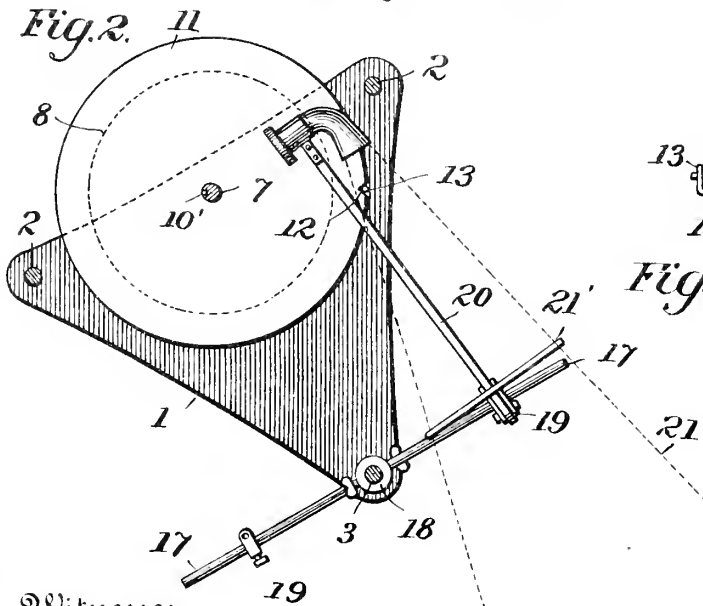
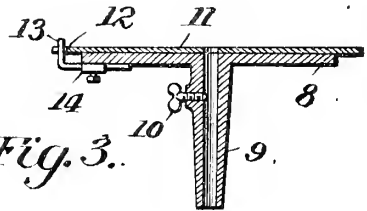


Fig. 3.



Witnesses:
J. H. Kettel.
F. J. Chapman

Inventor:
Joseph Sanders,
By Lynn Bising.
Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

GRAMOPHONE.

SPECIFICATION forming part of Letters Patent No. 785,766, dated March 28, 1905.

Application filed December 13, 1904. Serial No. 236,725.

To all whom it may concern:

Be it known that I, JOSEPH SANDERS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

This invention has reference to improvements in gramophones of the type shown and described in Letters Patent No. 692,502, granted to Emile Berliner on February 4, 1902. The gramophone of the Letters Patent was designed to greatly magnify the recorded sounds and was based upon the exact similitude of the commercial form of gramophone-record duplicates. It consisted of a number of gramophone reproducer-machines coupled together and to a common motor for simultaneous and synchronous action, so that the reproductions of several records (six being shown in the patent) were merged to have the effect of a single reproduction of greatly-increased intensity. The multiple gramophone or "multiphone" of the aforesaid Letters Patent occupied a floor-space of considerable extent, since the several record-supporting tables were each individually mounted upon a common base-plate. Also since the removal of reproduced record-tablets and the placing of others in the machine of the patent took considerable time long intervals of silence would elapse between the reproductions of records. In addition to this the multiplication of gearing necessary to drive several individual rotary tables was found to be prohibitive because of the noise produced, so that finally a flexible belting was adopted because of its easy and noiseless running. This, however, introduced a new difficulty in that absolute synchronism, so necessary to the perfect merging of the several reproductions, was sometimes lost, owing to the slight elasticity of a flexible belt and the consequent running of the record-tablets out of step.

It is the object of the present invention, first, to greatly reduce the floor-space occupied by the machine; second, to so arrange the record-tablet supports that both the record-tablets and their supporting-tables may be removed from and replaced in the machine

bodily, so that while one set of records is being reproduced another set may be prepared for insertion and when desired may be inserted into the machine with the same facility and in practically the same time required to place one record-tablet upon a non-removable tablet-supporting table, and, third, to provide means whereby all the tables are in rigid and unyielding connection with the common motor and must therefore rotate in absolute synchronism. All this is fully set forth in the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my improved multiphone with the driving mechanism and some of the reproducer-heads and amplifying-horns omitted for the sake of clearness of illustration. Fig. 2 is a cross-sectional plan view with parts omitted. Fig. 3 is a vertical section of one of the record-supporting tables with a record-tablet in place, and Fig. 4 is a plan view of a modified form of record-supporting table with a record-tablet in place and showing the table-carrying arbor or shaft in cross-section.

Referring to the drawings, there is shown a triangular base 1, from the corners of which rise three uprights 2, 2, and 3. The upper ends of the uprights 2 2 are connected by an angle-piece 4, and the upper end of the upright 3 is connected to the center or angle of the angle-piece 4 by an arm 5. At the junction of the angle-piece 4 and arm 5 there is tapped a screw 6, passing downward through both and having the lower end tapered to engage a socket in the upper end of an upright arbor or shaft 7, the lower end of which is stepped in a suitable bearing 6' in the triangular base underneath and in line with the screw 6. Upon this shaft or arbor 7 there are a number of record-supporting tables 8, each having a central hub 9, projecting from one face and fitting closely on said shaft. Each table is held on the shaft by a thumb-screw 10 entering a longitudinal groove 10' in the shaft. The tables 8 may be disk-shaped, as shown in Figs. 1, 2, and 3, or they may consist of three radial arms disposed one hundred and twenty degrees apart, as shown in Fig. 4.

In order that the record-tablets 11 used upon the tables 8 may all agree in relative position for simultaneous reproduction, they are each provided with an identically-located peripheral notch 12, into which a finger 13 engages, being adjustably secured in a bracket 14 on the under side of each table 8 in the form shown in Fig. 3, so that different-sized records may be used, or the finger may be integral with one of the arms of the form shown in Fig. 4, as shown at 15. The peripheral notch 12, with the finger 13 engaging the same, is a particularly accurate means of locating the record-tablet in a definite position on the rotating table, since the notch in the record-tablet would be located by making such a notch in the edge of the matrix from which the record-tablet is pressed out. Thereby the location of the notch with respect to the record itself will be the same in any number of record-tablets made from the same matrix. Such notch I call a "position-notch."

A number of tables 8, (six being shown in the drawings,) each with a record-tablet in place, are strung upon the shaft 7 and are secured thereto by the thumb-screws 10, which latter enter into the groove 10', and so determine the relative position circumferentially upon the shaft. The distances between the tables are determined by the hubs 9. The shaft, tables, and record-tablets thus assembled constitute a single compact structure which may be placed into or removed as a whole from the machine, the shaft fitting between the step-bearing 6' in the base 1 and the screw 6, the latter being screwed downward until its end engages the socket forward in the upper end of the shaft. The shaft and its tables may now be rotated by any suitable source of power, and in the drawings, Fig. 1, there is shown a pulley 16 on the lower end of the shaft as a means for applying power. Other means may be used, it only being necessary that the driving mechanism be such that the shaft may be readily placed into or removed from the machine.

Secured to the upright 3 are a number of arms 17, each projecting from a collar 18, fixed adjustably to the upright by a thumb-screw. Adjustably fixed to each arm is a socket 19, receiving the pintle of the fork 19' of the usual universal joint of the swinging arm 20 for carrying the amplifying-horn 21 and sound-box 22 of the ordinary commercial gramophone. The horn is supported on the curved cross-arm 21', as usual. The arms 17 and sockets 19 need not be adjustable. For economy of space the arms 17, one for each table 8, project alternately from opposite sides of the upright 3 and the reproducer-heads and amplifying-horns are arranged alternately on either side of the said upright 3. The alternate reproducer-stiles will therefore engage the records from opposite edges, and the fingers 13 are therefore arranged on correspond-

ingly opposite sides of the tables 8, so that when the parts are all in place the stiles will engage the record grooves all at the same point.

The synchronous rotation of the several tables being assured by the shaft 7 and the identity of position of the record-tablets being assured by the fingers 13 or 15 engaging the notches 12, it follows that if care be taken to place the stile of each reproducer-head upon the same line, but preferably the first line of each record, an absolute coincidence of all the reproductions must result. To facilitate the placing of the stile upon the first line of the record, which is always a difficult and uncertain procedure on account of the shallowness and narrowness of the grooves, I make the first or a part of the first turn of the groove much deeper and wider than the remainder of the spiral groove, so that it is clearly visible to the unaided eye and will stand out prominently as a mark which cannot be missed. This widened and deepened portion of the first line of the spiral groove I make by preference a smooth groove, containing no record, and this guide-groove may, if desired, run out into or near to the edge of the record-disk. This construction is indicated in Fig. 4, on which the record-groove proper is represented diagrammatically by the spiral 11', while the guide-groove is indicated by the heavier portion 11² of the spiral which represents the case where the record progresses from the outer turns of the spiral inwardly; but when, as has been proposed, the record progresses from the inner turns of the spiral outwardly the guide-groove is of course made to lead into the innermost turn of the record-groove. Such guide-groove is indicated in dotted lines at 11³. An additional advantage of the deep guide-groove is that it prevents the needle from being shaken out and displaced into another groove by the shock at the starting of the machine. With a single gramophone plate and reproducer such displacement of the needle at the start frequently occurs, but is there of no consequence, since at the worst nothing is lost but a small portion of the reproduction, while in a multiphone such accident would be fatal, since thereby one needle might come into engagement with one part of the record while another needle or all the other needles might be in engagement with another part of the record, and thus the coincidence of all reproductions which is absolutely necessary would be lost.

In the apparatus described there is no danger of any of the records getting out of step because of flexibility of connections for driving the tables.

I do not herein claim the gramophone-tablet shown and described, since the same is claimed in my application filed as a division hereof on February 1, 1905, Serial No. 243,705.

Having now fully described my invention,

what I claim, and desire to secure by Letters Patent, is—

1. A multiphone comprising a number of rigidly-connected supports for a like number of identical gramophone record-tablets, means for rotating said supports and tablets synchronously about a common axis, and a number of sound-reproducers, one for each tablet, and all adapted to be placed in and to maintain the same operative relation to identical parts of the records, substantially as described.

2. A multiphone comprising a number of rigidly-connected supports for a like number of identical gramophone record-tablets, arranged for rotation about a common vertical axis, and a number of sound-reproducers, one for each tablet, and all adapted to be placed in and to maintain the same operative relation to identical parts of the records, substantially as described.

3. A multiphone comprising a number of rigidly-connected supports for a like number of identical gramophone record-tablets, arranged for rotation about a vertical axis and provided with means for locating and maintaining the several record-tablets in definite relation to each other, and a number of sound-reproducers, one for each tablet, all adapted to be placed in and to maintain the same operative relation to identical parts of the records, substantially as described.

4. A multiphone comprising a shaft, a number of supports for identical gramophone record-tablets, removably but rigidly mounted upon said shaft for synchronous rotation, and a like number of sound-reproducers each adapted to be placed in and to maintain the same operative relation to the same parts of a record as all the others, substantially as described.

5. A multiphone comprising a suitable frame, a removable, vertical shaft mounted therein, a series of supports for identical gramophone record-tablets, rigidly but removably secured on said shaft, and a like number of sound-reproducers each adapted to be placed in and to maintain the same operative relation to the same parts of a record as all the others, substantially as described.

6. A multiphone comprising a suitable frame, a removable vertical shaft mounted therein, a series of supports for identical gram-

ophone record-tablets rigidly but removably secured on said shaft, a corresponding series of sound-reproducers arranged alternately upon opposite sides of said shaft, and means for establishing and maintaining the several record-tablets in definite relation to each other and all in identical relation to the corresponding reproducers, substantially as described.

7. An exchangeable element for a multiphone consisting of a shaft and a number of supports for gramophone record-tablets, rigidly but removably secured upon said shaft, substantially as described.

8. An exchangeable element for a multiphone consisting of a shaft and a number of record-tablet supports rigidly but removably secured thereon in definite relation to each other, and means on each support for locating and maintaining a record-tablet in definite position thereon, substantially as described.

9. A supporting-table for a gramophone record-tablet having an adjustable stop for determining the position of record-tablets of different sizes on the said table, substantially as described.

10. A supporting-table for a gramophone record-tablet having a peripheral, radially-adjustable stop for determining the position of record-tablets of different sizes on said table, substantially as described.

11. In a multiphone, the combination of a number of supporting-tables each having a stop for determining the position of a record-tablet on the table, with an identical record-tablet for each table and each provided with a notch identically located in relation to the same selected portion of the record-groove and adapted for engagement by the stop, substantially as described.

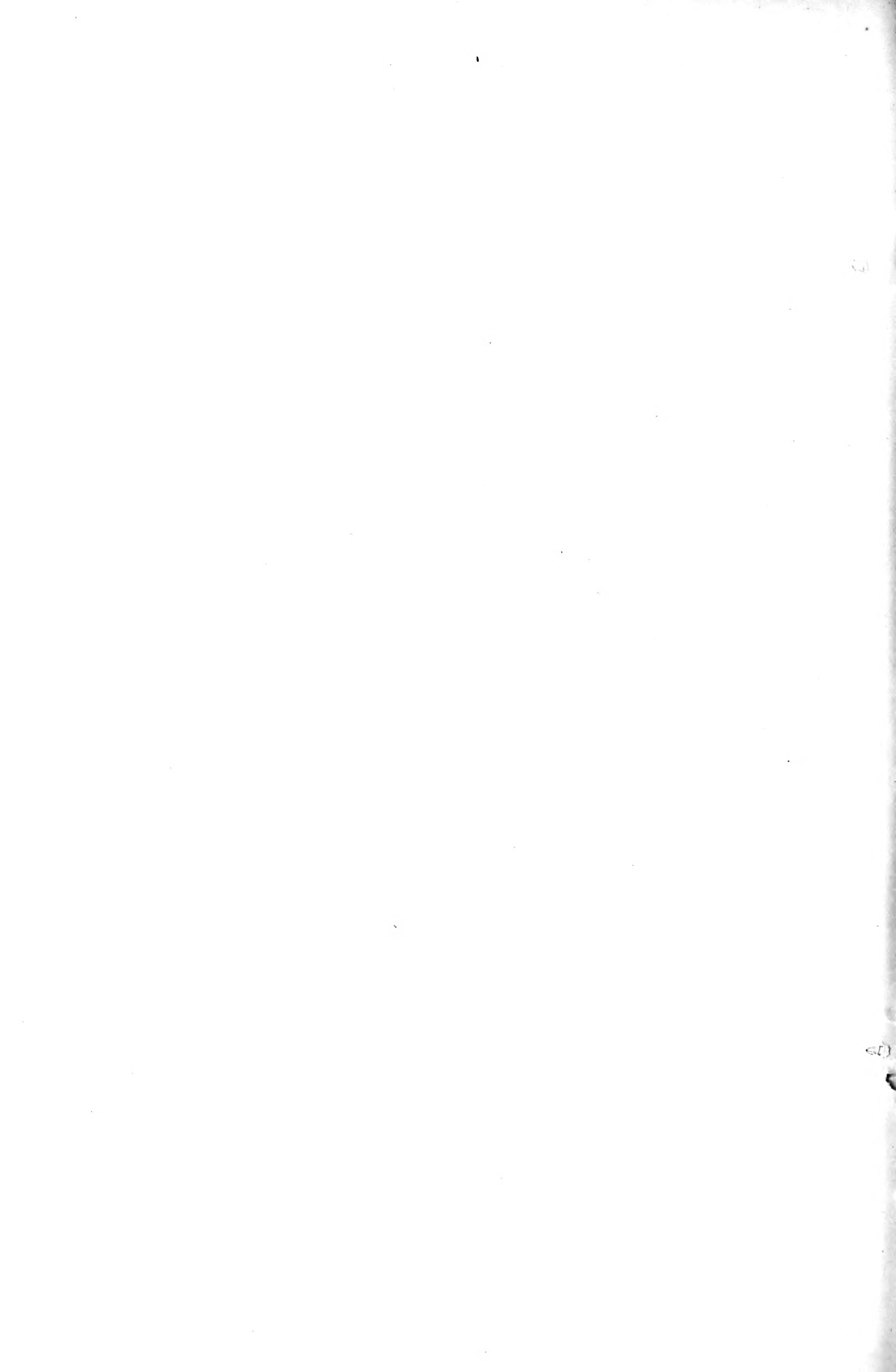
12. The combination of a gramophone record-tablet formed with a peripheral notch, with a supporting-table for the tablet provided with a stop for engagement with the notch in the tablet, substantially as described.

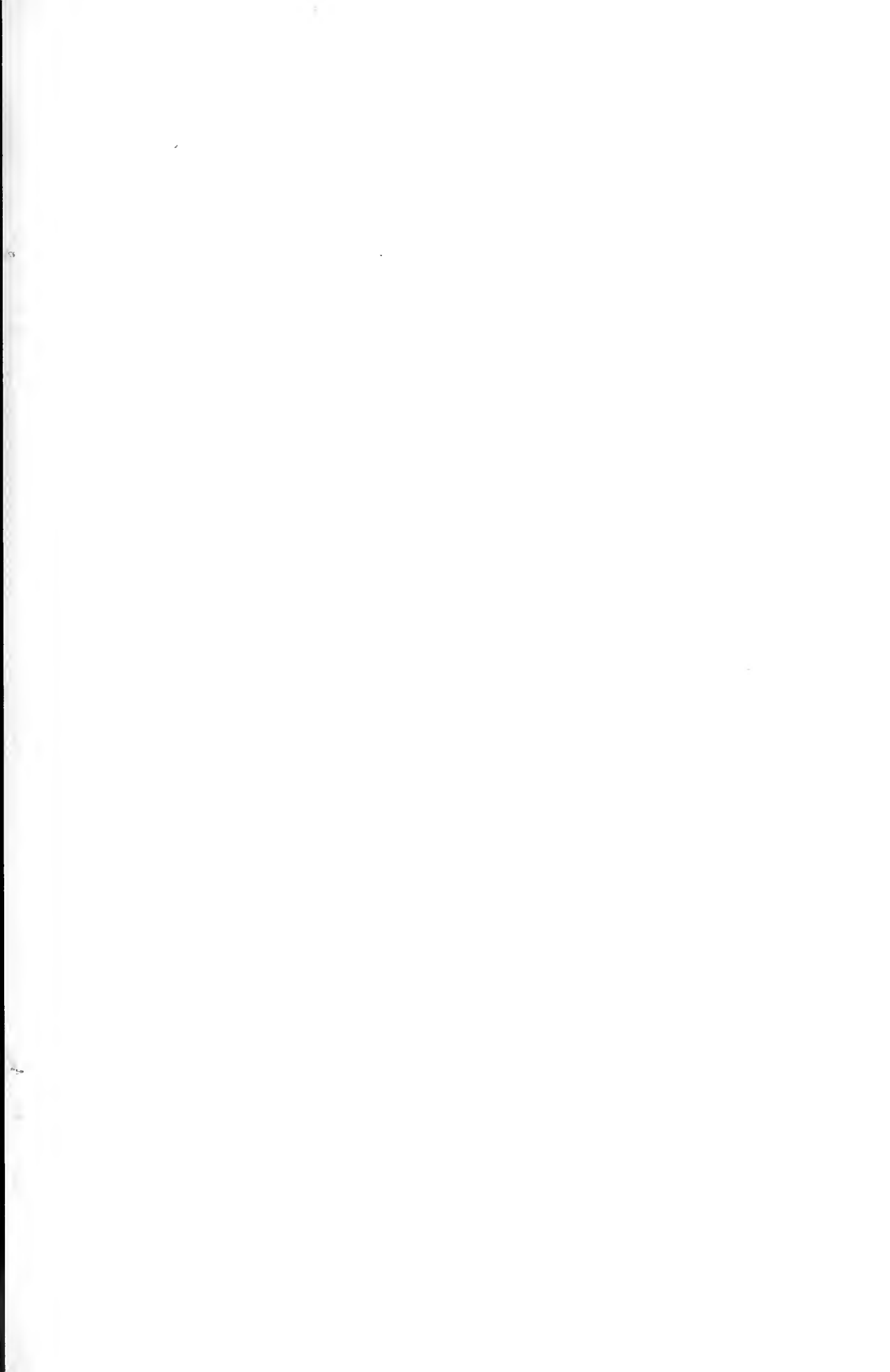
In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH SANDERS.

Witnesses:

F. T. CHAPMAN,
EDWIN S. CLARKSON.

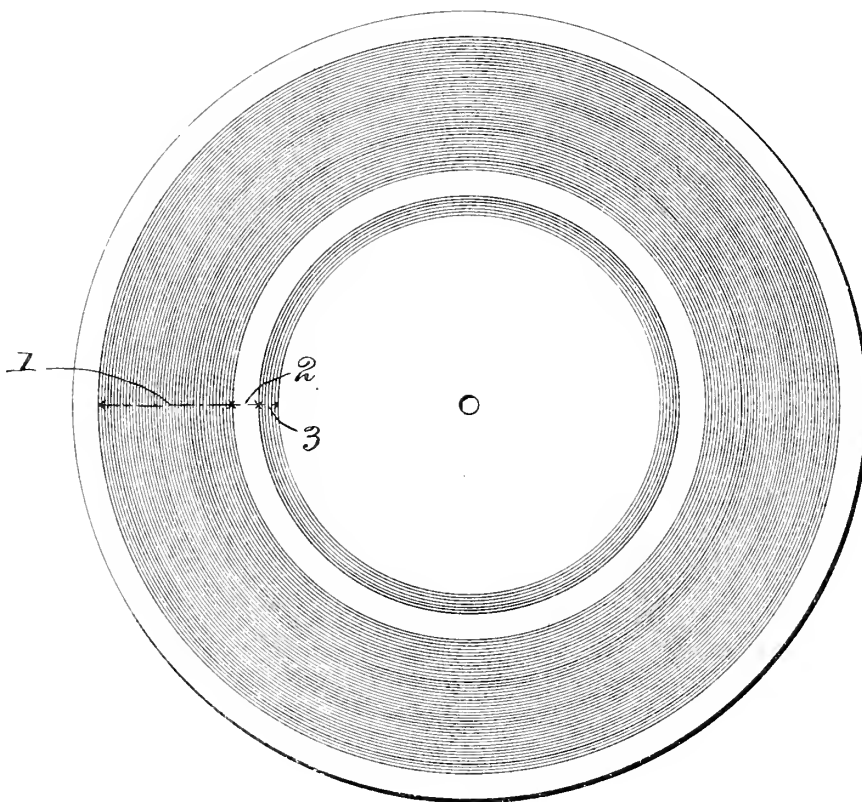




No. 786,347.

PATENTED APR. 4, 1905.

W. S. DARBY.
RECORD FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED JAN. 12, 1905.



WITNESSES:

F. Barry
Edw. W. Vaclav Jr.

INVENTOR:

William S. Darby
By Wm. Pitt

ATTORNEY:

UNITED STATES PATENT OFFICE.

WILLIAM SINKLER DARBY, OF BERLIN, GERMANY, ASSIGNOR TO VICTOR TALKING-MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

RECORD FOR SOUND-REPRODUCING MACHINES.

SPECIFICATION forming part of Letters Patent No. 786,347, dated April 4, 1905.

Application filed January 12, 1905. Serial No. 240,723.

To all whom it may concern:

Be it known that I, WILLIAM SINKLER DARBY, a citizen of the United States of America, and a resident of Berlin, Germany, have invented certain new and useful Improvements in Records for Sound-Reproducing Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to improvements in record disks or cylinders for sound-reproducing machines, and has for its object the provision of certain means for determining the correct speed at which said disks or cylinders should revolve in order that the sound produced thereby will have the same pitch as the sounds of the original voice or instrument which are being reproduced therefrom.

Heretofore there has been some difficulty in adjusting the speed of motors used in connection with sound-reproducing machines to cause the disks or cylinders to rotate at the correct speed required to give out the same number of vibrations per second or pitch that constituted the original sounds when recorded. For this purpose in some instances speed-indicators in connection with governors for talking-machine motors have been used; but such devices are not susceptible of delicate adjustment and, added to differences in the quality and consistencies of the material forming the parts of such governors, have varied greatly in different machines. By the use of the present invention these objections have been avoided in a simple, efficient, and accurate manner and without in any way increasing the cost of making a particular record and without complicating the construction of the talking or reproducing machine.

For a detailed description of one form of my invention reference may be had to the following specification and drawing, forming a part thereof, in which the figure of the drawing shows a plan view of a record embodying my invention.

In said drawing the numeral 1 denotes the space covered by the main record-groove, which contains the sound vibrations corresponding to a particular selection.

2 denotes an auxiliary spiral groove which contains the vibrations only of a particular note or tone. The auxiliary groove 2 is preferably separated from the main groove 1 by means of a narrow blank space or gap 3.

In forming the original or master record in accordance with this invention the record of the voice or instrument is made in the usual way, after which the recording instrument is shifted slightly and caused to form a groove while the original record is still rotating at the same speed as when forming the groove constituting the record of the voice or instrument; but in forming the auxiliary groove only one note or tone is sounded, and such note or tone is a series of successive vibrations caused by the sound produced by one key or note of an instrument or one tone of a voice. The instrument for forming the vibrations of the auxiliary groove may be a reed diaphason, the tuning-fork, the pitch-pipe, or other suitable standard instruments. The original or master record is then reproduced or multiplied in any of the usual ways for supplying duplicates to the trade.

When the records are sold, a standard instrument having the same pitch as the instrument used in forming the auxiliary record-groove is supplied to the users of the machine. By the aid of this instrument the user can quickly and accurately adjust the speed of the turn-table or cylinder motor, so that when the stylus or needle of the sound-box is applied to the auxiliary groove the sound produced thereby is exactly of the same pitch as the standard instrument. This may be accomplished in the usual manner of securing unison when tuning a violin or other similar musical instrument. When perfect unison has been secured between the sound produced by the auxiliary groove and the standard tuning instrument, the main record will be revolving at the correct speed, and the reproducing apparatus may then be shifted so as to traverse the groove of said main record. It will thus be seen that I have produced a very simple means of determining the correct speed at which a record should revolve, and it is obvi-

ous that changes in form and arrangement of parts may be made without departing from the spirit and scope of my invention; but

5 What I claim as my invention, and desire to protect by Letters Patent, is—

1. In a record for talking-machines, the combination with the main record-groove, of an auxiliary record-groove comprising simple vibrations of definite pitch.

10 2. In a record for talking-machines, the combination with the main record-groove, of an auxiliary record-groove comprising simple vibrations of a key-note.

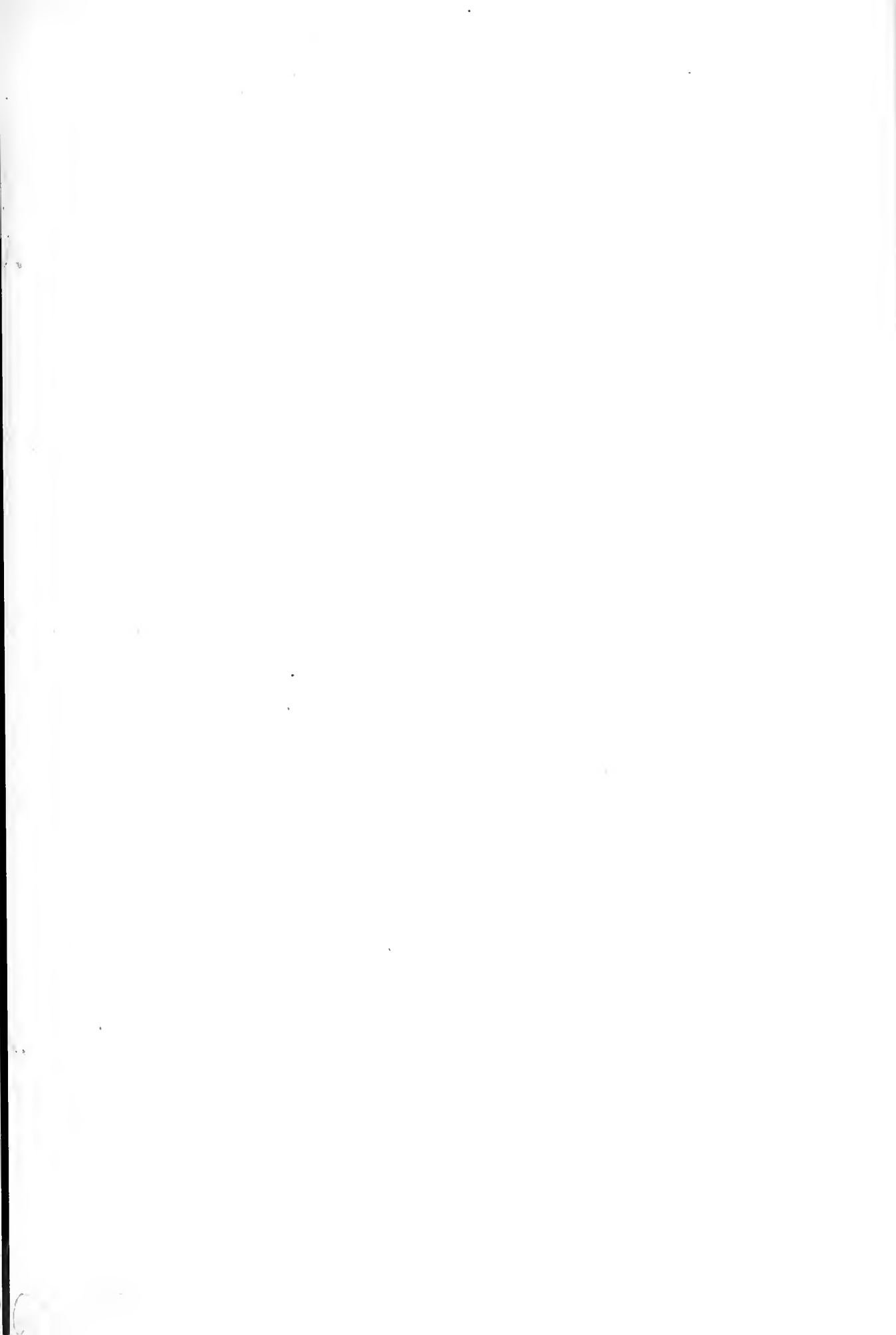
3. In a record for talking-machines, the combination with the main record, of an auxiliary record-groove comprising similar vibrations of such a number per inch in the length of the groove as will give a key-note of definite pitch when the record is revolving at the correct speed. 15

In witness whereof I have hereunto set my hand this 14th day of December, 1904. 20

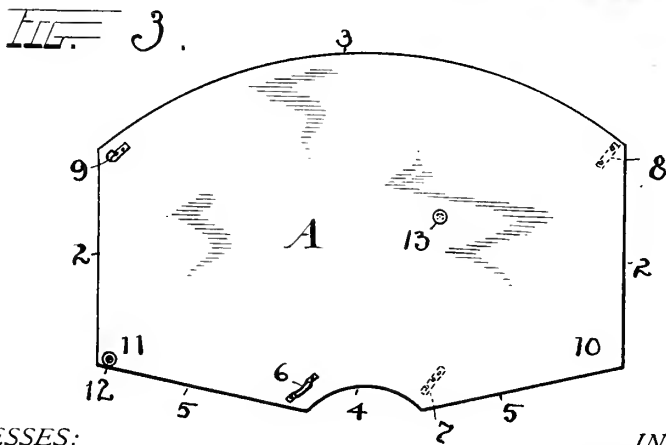
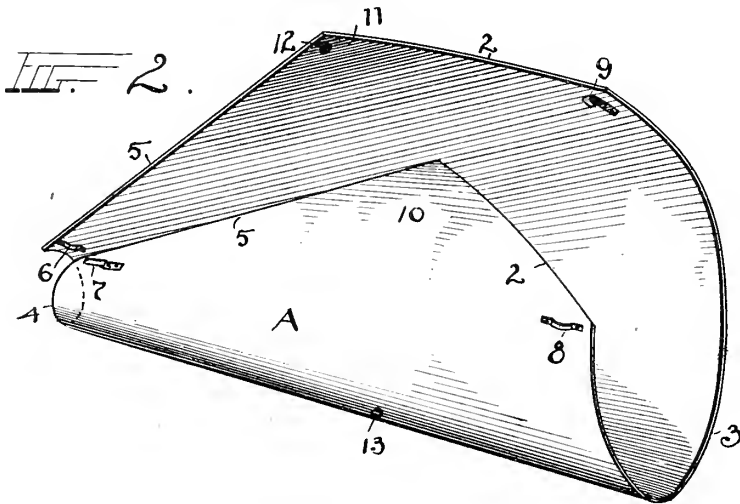
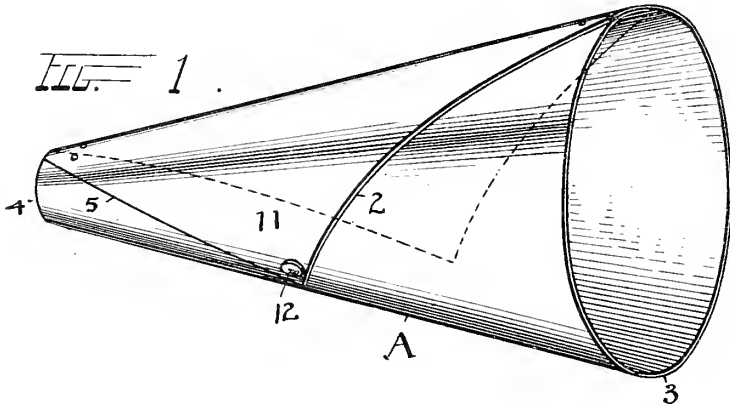
WILLIAM SINKLER DARBY.

Witnesses:

S. W. B. MORTMAN,
E. H. CHRISTENSEN.



C. M. ZELLERS.
FOLDING TRUMPET OR MEGAPHONE.
APPLICATION FILED SEPT. 9, 1904.



WITNESSES:

A. Moser.
R. B. Moser.

INVENTOR.
Claude M. Zellers
BY *H. J. Fisher*
ATTORNEY.

UNITED STATES PATENT OFFICE.

CLAUDE M. ZELLERS, OF CLEVELAND, OHIO.

FOLDING TRUMPET OR MEGAPHONE.

SPECIFICATION forming part of Letters Patent No. 786,395, dated April 4, 1905.

Application filed September 9, 1904. Serial No. 223,828.

To all whom it may concern:

Be it known that I, CLAUDE M. ZELLERS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Foldable Trumpets or Megaphones; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to foldable trumpets or megaphones; and the invention consists in a trumpet or megaphone adapted to be folded and unfolded and constructed and arranged substantially as hereinafter described, and more particularly pointed out in the claims.

Owing to the length and peculiar shape of the ordinary trumpet or megaphone made in one solid part, great inconvenience is experienced in packing, shipping, and handling, and when carried by hand the article is especially cumbersome and awkward to hold. To overcome these disadvantages, I have designed and constructed a simple foldable device made of one piece of flexible material which can be rolled into small compass when not in use and unfolded and shaped to form a trumpet or megaphone of the proper proportions when desired for use.

In the accompanying drawings, Figure 1 is a perspective view of my improved megaphone shaped and locked into form as in use. Fig. 2 is a perspective view of the megaphone partly rolled to shape to more clearly indicate the locking relations of the fastening-pieces. Fig. 3 is a plain elevation of the blank or form flattened out and with the fastening devices thereon.

In its simplest aspect the invention consists of a single piece of fairly stiff and thick cardboard A or like material having good resonant qualities and adapted to be rolled without breaking or creasing and shaped to form a speaking-trumpet or megaphone when rolled and interlocked for use. To this end a blank or form A is cut with parallel sides 2 and with its front edge 3 curved outwardly the full width of the blank and its

rear edge incurved in part at 4 and with straight inclined edges 5 at either side of curved edge 4 leading to sides 2. This blank so shaped will give perfect circular openings at opposite ends of proper size for mouth-piece and sound-outlet, respectively, when the blank is properly rolled into trumpet shape, and the sides 2 provide overlapping pieces which reinforce each other at the center and make a stiff and durable tube.

To hold the tube in proper shape and form, I provide simple interlocking parts or devices, which comprise in the present instance a loop 6, secured upon the inner face of blank A at the mouth end, into which loop a tongue 7, riveted upon the outer face of the blank, is adapted to slip and hold the mouth end closed and lock it against expansion or contraction. The opposite end of blank A is also provided with a loop 8, mounted upon the outer face of the blank at the upper right-hand corner, and which loop is engaged by a hook-shaped tongue 9, mounted upon the opposite face and at the opposite side of the blank A. Corner 10 of the blank is folded and curls within the tube and is overlapped by flap or corner 11, and a suitable separable locking-button 12 and an eye or socket 13 are provided for said respective corners to lock the flap end 11 and round off the tube centrally between its ends. A glove-fastener or any other well-known fastening device may be used for this purpose.

To assemble and form the tube, engagement is first made between loop 6 and tongue 7, and then the opposite end of the blank is curled around to fasten hook 9 and loop 8 together. The tendency of the blank when rolled is to uncurl or spring outward, and this keeps hook 9 in locking engagement with loop 8. Lap 11 is the last to be fastened and the first to be opened.

Form A when flat is convenient for packing and shipping and economizes in space as compared with a round package or article. For convenience in carrying by hand the form is readily rolled into a small roll of the same diameter end to end and reduced to such dimensions and size as to be readily carried in an outer coat-pocket.

What I claim is—

1. In megaphones or trumpets, a blank of flexible material having parallel side edges and an outwardly-curved edge at one end and an inwardly-curved edge at the opposite end of less length of curvature than said outwardly-curved edge and providing angular-shaped portions at each side adapted to overlap and brace the tube centrally when folded, and fastening means at each side at the outer and lower ends of the blank and at the outer overlapping portion to hold the blank in trumpet form when folded.

2. A foldable trumpet or megaphone consisting wholly of a sheet or blank of flexible material, like heavy paper or cardboard, and formed with ends 3 and 4 curved on different arcs and edges 2 and 5, respectively, at each

side providing angular-shaped side portions 10 and 11 adapted to overlap centrally between the ends when rolled in trumpet form, loops and tongues secured separately at opposite sides and upon the opposite faces of said blank at one end, loops and hooks secured separately at opposite sides and upon the opposite faces of said blank at the other end, and means to separably engage the outer overlapping side portion on the body of the roll.

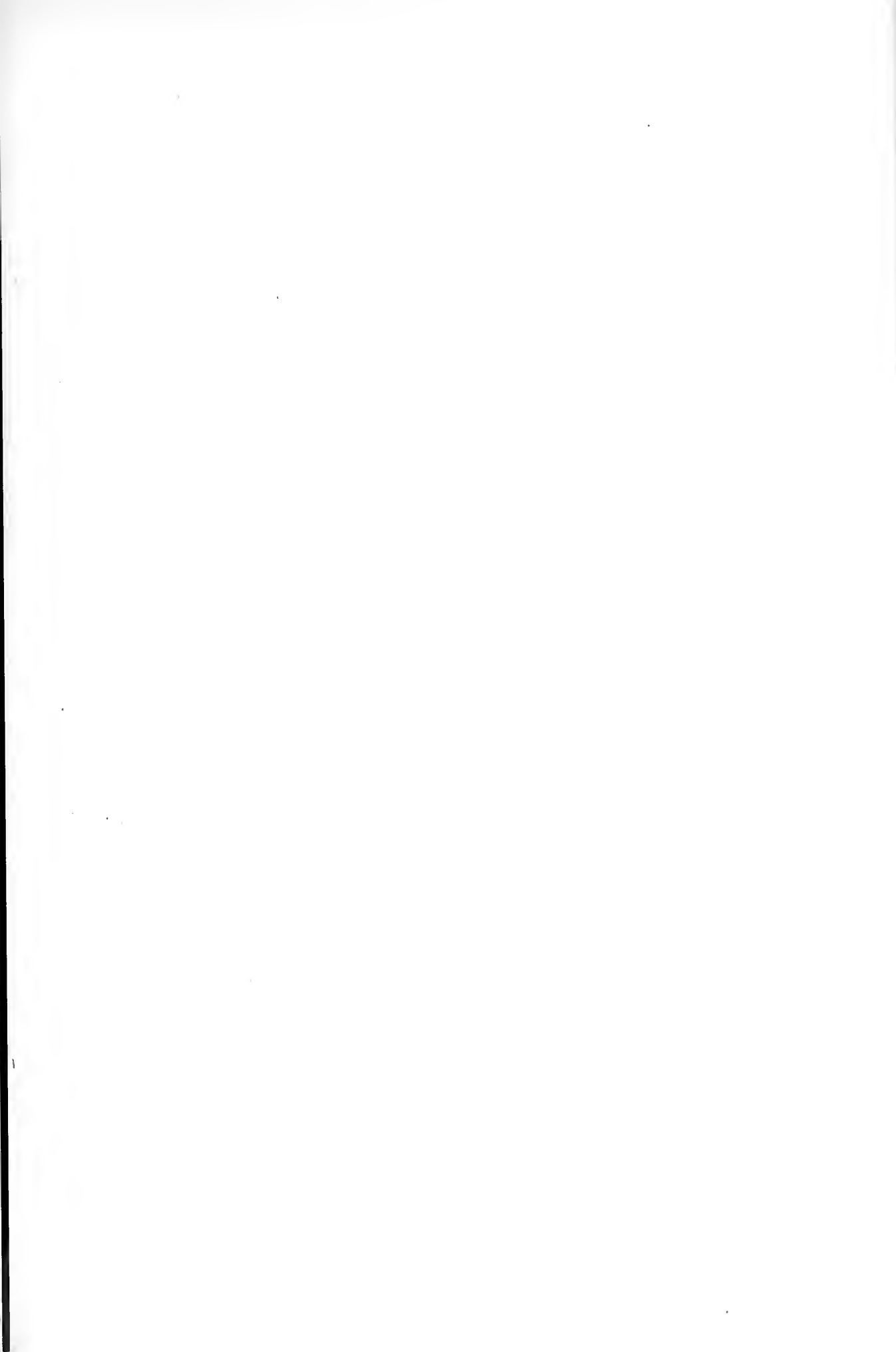
In testimony whereof I sign this specification in the presence of two witnesses.

CLAUDE M. ZELLERS.

Witnesses:

R. B. MOSER,

A. N. MOSER.



No. 786,449.

PATENTED APR. 4, 1905.

H. H. KUHN.
TALKING MACHINE ATTACHMENT.
APPLICATION FILED SEPT. 19, 1904.

FIG. 1.

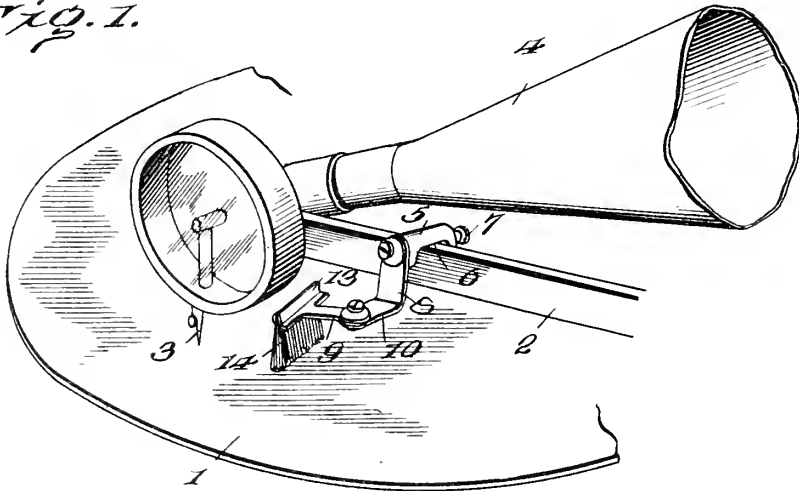


FIG. 2.

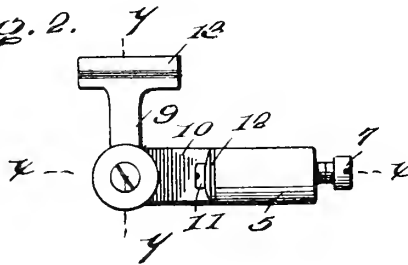


FIG. 3.

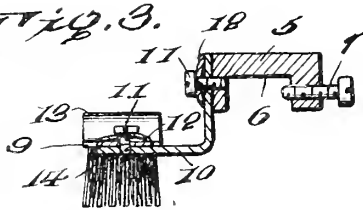
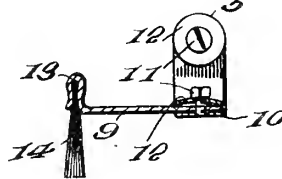


FIG. 4.



Inventor

H. H. KUHN.

Witnesses

J. M. ...
W. A. Woodson.

By

R. H. ...
Attorneys

UNITED STATES PATENT OFFICE.

HARRY H. KUHN, OF MARSHALL, ILLINOIS.

TALKING-MACHINE ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 786,449, dated April 4, 1905.

Application filed September 19, 1904. Serial No. 225,063.

To all whom it may concern:

Be it known that I, HARRY H. KUHN, a citizen of the United States, residing at Marshall, in the county of Clark and State of Illinois, have invented certain new and useful Improvements in Talking-Machine Attachments, of which the following is a specification.

This invention has relation to talking-machines, such as graphophones or the like, and embodies, essentially, a brush attachment adapted to traverse the surface of the record cylinder or disk used in connection with the stylus of the machine in the production of the sound.

The attachment is designed to be secured to the supporting-arm which carries the stylus or reproducer, and when in operative position the brush preferably travels slightly in rear of the stylus, passing over the entire surface of the cylinder or disk, as the case may be, keeping such surface perfectly clean and preventing the accumulation of dust or similar foreign matter, which might prevent proper working of the talking-machine in a manner readily apparent.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the same for effecting the result reference is to be had to the following description and accompanying drawings.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view showing the invention applied to the talking-machine, the adjacent parts of the latter only being illustrated. Fig. 2 is a plan view of the attachment alone. Fig. 3 is a vertical sectional view taken on the line X X of Fig. 2. Fig. 4 is a view similar to Fig. 3, the section being taken about on the line Y Y of Fig. 2.

Corresponding and like parts are referred to in the description and indicated in all the views of the drawings by the same reference characters.

It will be understood that the attachment which comprises the invention may be used

upon any of the ordinary types of graphophones, that illustrated in the drawings being of the class in which the sound is reproduced from a revoluble disk 1, such as is commonly employed. The supporting-arm 2, which carries the reproducer or stylus 3 and the megaphone 4, is movably mounted in the usual manner in order that the stylus 3 may traverse the disk 1 in the operation of the machine. The attachment is secured to the supporting-arm 2 by means of a clamp member 5, the latter being bifurcated, as shown at 6, so as to readily receive the arm 2 in the portion 6 in securing the attachment upon said arm. A set-screw 7 is mounted in one end portion of the clamp member, and the inner end of this set-screw projects into the space formed by the bifurcated portion 6 of the clamp member, being adapted to engage the arm 2 positively in order to rigidly position the attachment thereon.

In addition to the clamp member 5 the attachment consists of a vertically-adjustable arm 8 and a horizontally-adjustable arm 9. The arm 9 is angularly adjustable relative to the arm 8 and is mounted upon a lateral extension 10 at the lower end of the said arm 8. The vertically-adjustable arm 8 is secured to the end of the clamp member opposite that having the set-screw 7, above described. Screws 11 or similar fastenings are used to secure the arm 8 to the part 5 and the arm 9 to the extension 10, and spring-washers 12 of cupped or concave form in cross-section are interposed between the heads of the fastenings 11 and the members 9 and 8 adjacent. The washers 12 when the fastenings 11 are secured thereagainst frictionally bind against the parts 9 and 8, so that when said parts are adjusted by the pivotal movement thereof they will be held at any desired adjustment by the frictional contact of the parts 12. The arm 9 extends forwardly from the extension 10 of the arm 8, and the forward extremity of the arm 9 is widened, thus forming a head 13, carrying the brush 14. The brush material is secured in the head 13 in any suitable manner, and such material is preferably camel's hair or the like having requisite flexibility and softness in order to prevent injury to the sur-

face of the cylinder or the disk 1 over which the brush travels. Vertical attachment of the arm 8 enables this member to be so positioned as to cause the brush 14 to bear with greater or less pressure upon the disk 1, and the horizontal movement of the arm 9 is advantageous in that this arm may be fixed so as to bring a greater or less amount of brush material into contact with the part 1 as regards the width of the given track of the movement of the brush upon said part 1. In other words, angular attachment of the arm 9 will dispose the brush 14 with the front portion or side portion thereof directly in rear of the stylus 3, as may be found most desirable for the purposes of the invention.

The attachment may be made of metal and can be very cheaply manufactured.

Having thus described the invention, what is claimed as new is—

1. An attachment for talking-machines, comprising a clamp member adapted to be secured to the reproducer-supporting arm of the machine, a vertically-adjustable arm, a second arm angularly adjustable relative to the vertically-adjustable arm, and a brush carried by the last-mentioned arm.

2. An attachment for talking-machines, comprising clamping means, a vertically-ad-

justable arm carried by said clamping means, a horizontal arm adjustable relative to the vertically-adjustable arm, and a brush carried by the said horizontal arm.

3. An attachment for talking-machines, comprising a clamp device, a vertically-adjustable arm having a lateral extension, a horizontally-adjustable arm mounted upon the lateral extension aforesaid, and a brush carried by said horizontal arm.

4. An attachment for talking-machines, comprising a clamp member having a bifurcated portion to receive the supporting-arm of the reproducer of the machine, means for securing said clamp member in position, a vertically-adjustable arm pivoted to one end of the clamp member and having a lateral extension at its lower end, a horizontal arm pivoted to the lateral extension of the vertically-adjustable arm, and a brush carried by the horizontal arm and arranged to travel in rear of the reproducer of the machine.

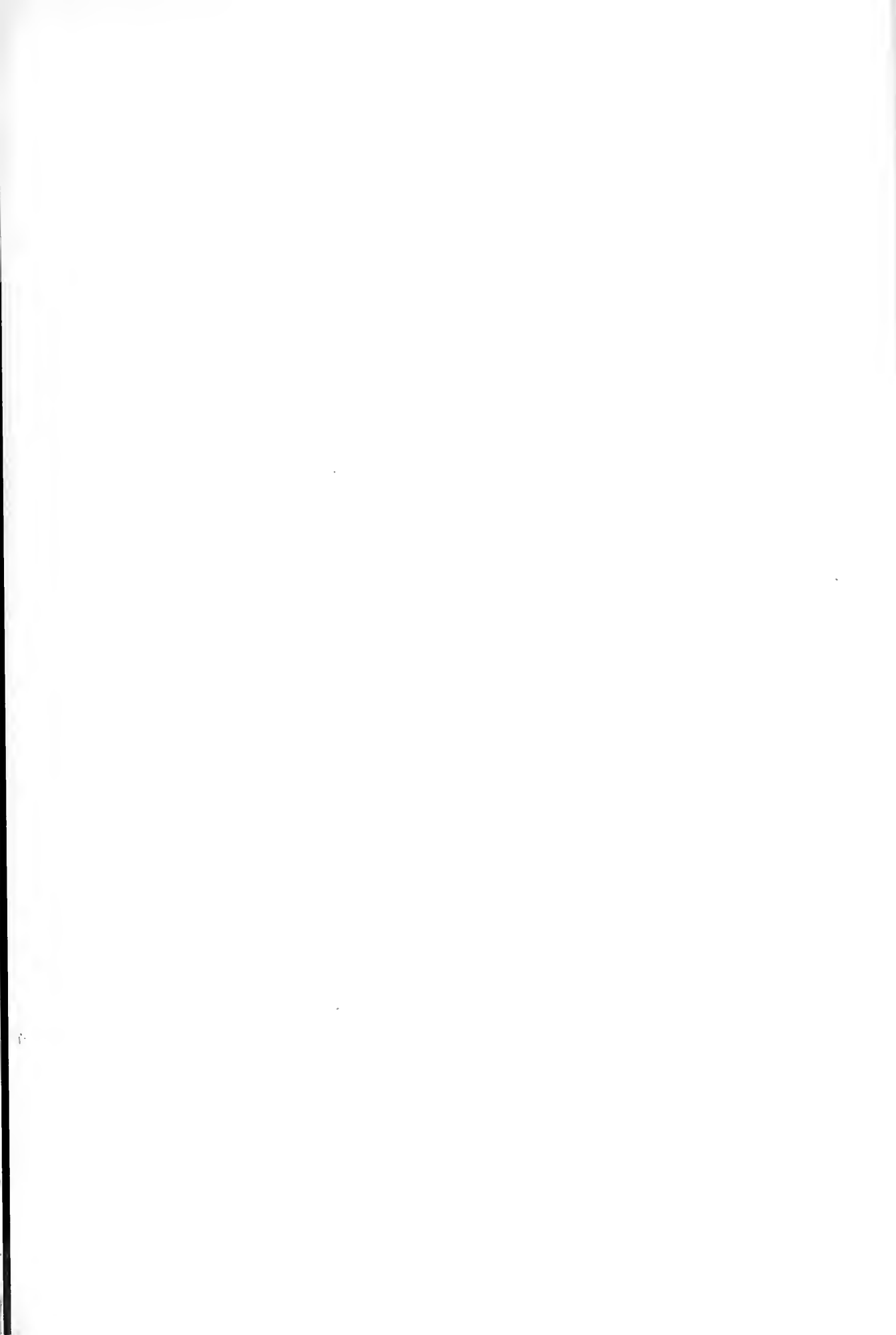
In testimony whereof I affix my signature in presence of two witnesses.

HARRY H. KUHN. [L. s.]

Witnesses:

EVA KUHN,

SIDANIA STEWART.



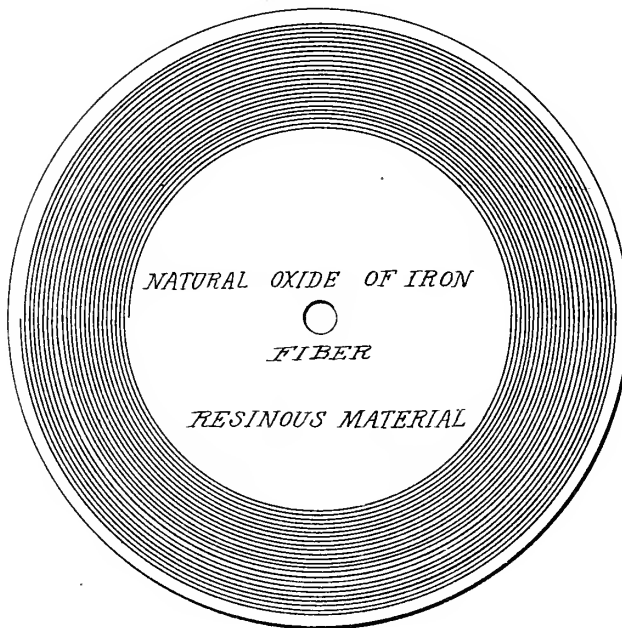
No. 787,001.

PATENTED APR. 11, 1905.

J. SANDERS.

COMPOSITION OF MATTER FOR SOUND RECORD TABLETS.

APPLICATION FILED JAN. 20, 1904.



Witnesses.

Edwin L. Yewell.
F. J. Chapman.

Inventor.

Joseph Sanders,

By

Lyons & Rising,

Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

COMPOSITION OF MATTER FOR SOUND-RECORD TABLETS.

SPECIFICATION forming part of Letters Patent No. 787,001, dated April 11, 1905.

Application filed January 20, 1904. Serial No. 139,889.

To all whom it may concern:

Be it known that I, JOSEPH SANDERS, a citizen of the United States, and a resident of Washington, in the District of Columbia, have
5 invented certain new and useful Improvements in Compositions of Matter, of which the following is a specification.

My invention has reference to a new composition of matter which is particularly adapted
10 for the manufacture of sound-record tablets which are designed to receive the impress of a sound-record matrix, whereby in the tablet the sound-record appears either as a groove of even depth, but laterally undulating
15 to represent the sound-waves, or as a groove of varying depth, in which case the variations of depth represent the sound-waves. More particularly is the new material designed for use in the formation of sound-record
20 tablets of the gramophone type, and I have found that gramophone-tablets made of this material are particularly durable, that the reproduced sounds which they yield are largely free of the muffled quality which is so characteristic
25 of the sounds yielded by other record-tablets, and that the scratching noises due to the coaction of the style with the record material become fainter by continued use, whereas with other record-tablets they become more and more intensified by continued
30 use.

Another important feature of my new composition of matter is that when used for a
35 sound-record tablet it is found that the friction between the style and the tablet is remarkably less than with tablets heretofore used and diminishes by continued use instead of increasing by use, as is the case with other sound-record tablets. As a result of this property
40 of my composition of matter, sound-record tablets made of the same do not cause the style to drag.

In the accompanying drawing, which forms a part of this specification, is shown a
45 diagrammatic face view of a gramophone record-tablet in the construction of which my new composition of matter is designed to be used.

My new composition of matter consists of an intimate mixture of an oxid or oxids of the

metals of the iron group, by preference the
50 natural oxid of iron, an animal or vegetable fiber, such as cotton or wool flock or wood fiber, and a resinous binding material, such as shellac or rosin, or both, or other resins. The proportions of these ingredients may
55 vary considerably; but I have found that for the production of sound-record tablets the following proportions yield excellent results, namely: natural oxid of iron, thirty parts, by
60 weight; fiber, three and one-half parts, by weight; resinous material, twenty parts, by weight. These ingredients are marked on the drawing; but, as will presently appear, I am not confined to these specific substances or to
65 the use of all of them.

Instead of oxid of iron I may use an oxid of manganese or an oxid of nickel, all of which
70 belong to the iron group of metals, or I may use mixtures of any desired proportion of these oxids; but I have found that the natural oxid of iron gives particularly good results.

The oxid of iron or other oxid is used in
75 finely-powdered condition, and the fiber is also rather finely divided. These ingredients are thoroughly mixed and kneaded together with the application of heat until the whole mass assumes the consistency of a rather stiff
80 dough. When thus thoroughly mixed and kneaded, the mass is pressed, rolled, or otherwise shaped into the desired form and allowed to cool. At ordinary temperatures this mass is very hard, but can be softened by moderate
85 heat sufficiently to receive a clear and sharp impression from a gramophone-matrix.

Any suitable coloring-matter may be used
90 in connection with the ingredients which I have named; but the oxids of the metals themselves may be properly chosen to give quite a variety of colors. Thus, for instance, when
95 the native oxid of iron alone is used the composition of matter will be reddish in color; if manganese oxid (dioxid) alone is used, the color of the composition of matter will be very nearly black, while a mixture of these two oxids will give intermediate colors.

I have found that I may dispense with the use of flock and still secure in a great measure

the advantages which my composition has over compositions heretofore used in the manufacture of sound-record tablets.

I claim as my invention—

- 5 1. As a material for sound-record tablets, the composition of matter consisting of an oxid or oxid of one or more metals of the iron group and a resinous binding material, substantially as described.
- 10 2. As a material for sound-record tablets, the composition of matter consisting of natural oxid of iron and a resinous binding material, substantially as described.
- 15 3. As a material for sound-record tablets, the composition of matter consisting of natural oxid of iron and shellac, substantially as described.
- 20 4. As a material for sound-record tablets, the composition of matter consisting of an oxid or oxid of one or more metals of the iron group, fiber, and a resinous binding material, substantially as described.
- 25 5. As a material for sound-record tablets, the composition of matter consisting of natural oxid of iron, fiber, and a resinous binding material, substantially as described.
- 30 6. As a material for sound-record tablets, the composition of matter consisting of natural oxid of iron, fiber, and shellac, substantially as described.
- 35 7. As a material for sound-record tablets, the composition of matter consisting of natural oxid of iron, fiber, and a binder composed of shellac and rosin, substantially as described.
- 40 8. A sound-record tablet consisting of a body composed of oxid or oxid of one or more metals of the iron group and a resinous binding material, and having a sound-record groove formed in its surface, substantially as described.
9. A sound-record tablet consisting of a body composed of oxid or oxid of one or more

metals of the iron group, fiber, and a resinous binding material, and having a sound-record groove formed in its surface, substantially as 45 described.

10. A sound-record tablet consisting of a body composed of natural oxid of iron and a resinous binding material, and having a sound-record groove formed in its surface, substantially as described. 50

11. A sound-record tablet consisting of a body composed of natural oxid of iron and shellac, and having a sound-record groove formed in its surface, substantially as described. 55

12. A sound-record tablet consisting of a body composed of an oxid or oxid of one or more metals of the iron group, fiber and a resinous binding material, and having a sound-record groove formed in its surface, substantially as described. 60

13. A sound-record tablet consisting of a body composed of natural oxid of iron, fiber and a resinous binding material, and having a sound-record groove formed in its surface, substantially as described. 65

14. A sound-record tablet consisting of a body composed of natural oxid of iron, fiber and shellac, and having a sound-record groove formed in its surface, substantially as described. 70

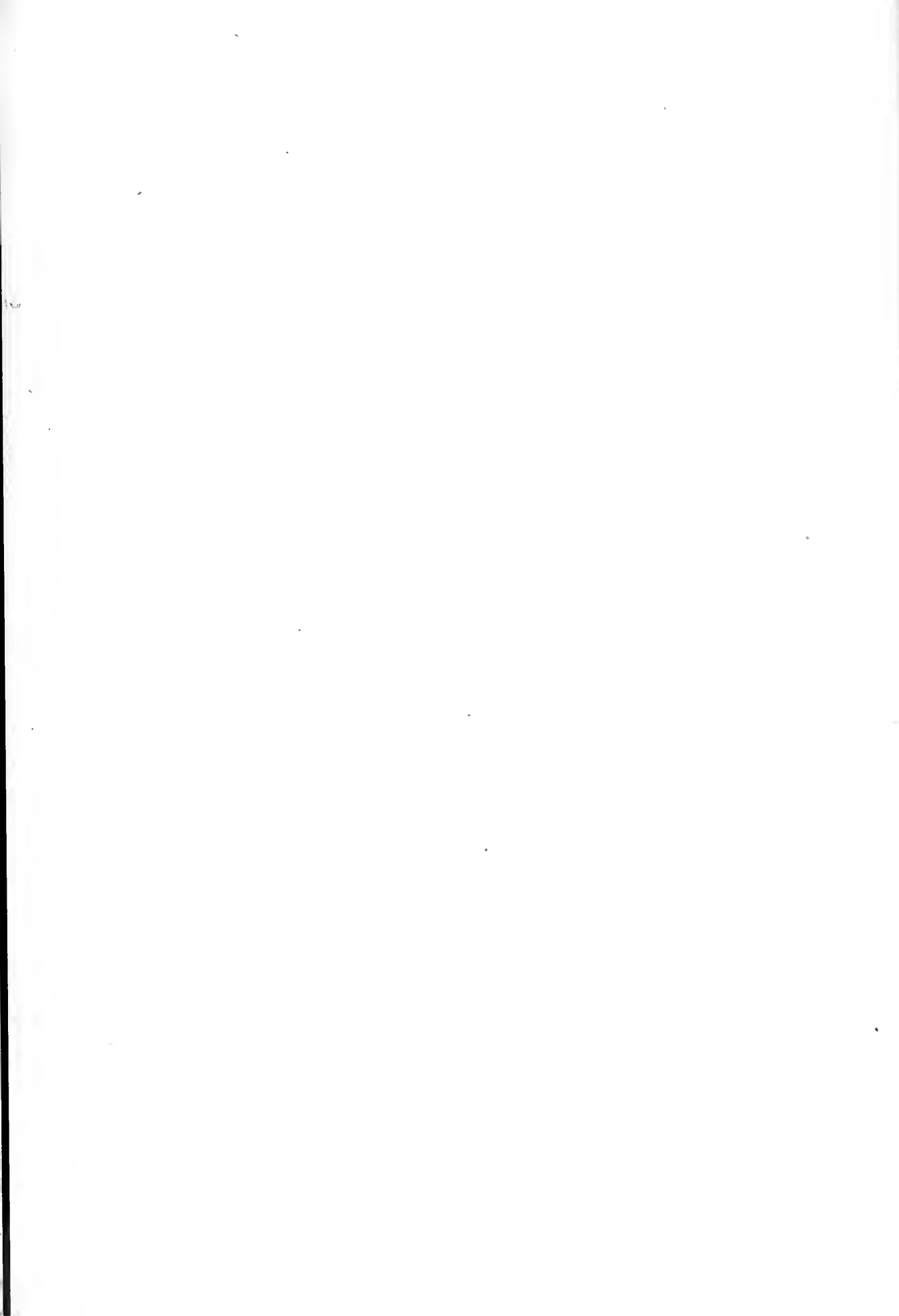
15. A sound-record tablet consisting of a body composed of natural oxid of iron, fiber and a binder of shellac and rosin, and having a sound-record groove formed in its surface, substantially as described. 75

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH SANDERS.

Witnesses:

JAS. WM. EWART,
W. HAWKE.



No. 787,264.

PATENTED APR. 11, 1905.

J. E. BEATTY.
TALKING MACHINE.
APPLICATION FILED MAR. 31, 1904.

2 SHEETS—SHEET 1.

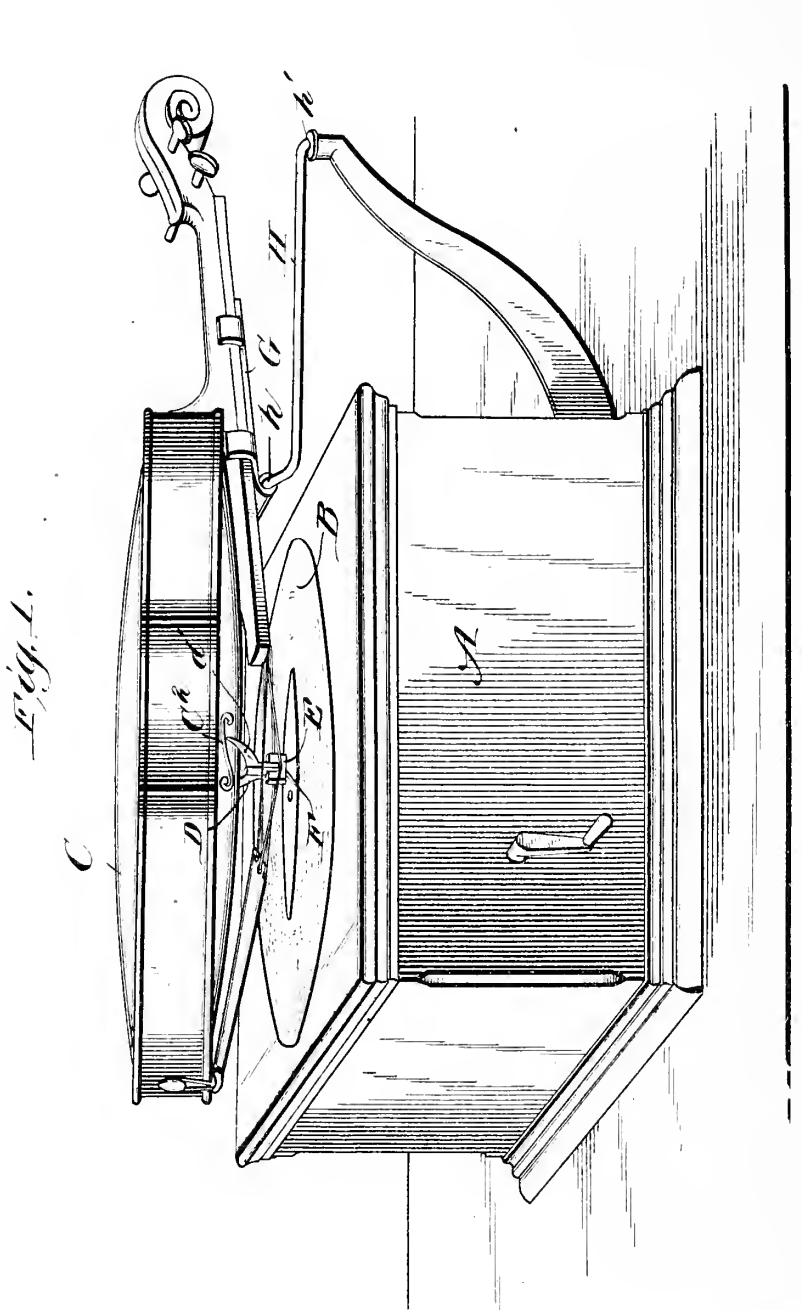


Fig. 1.

WITNESSES:

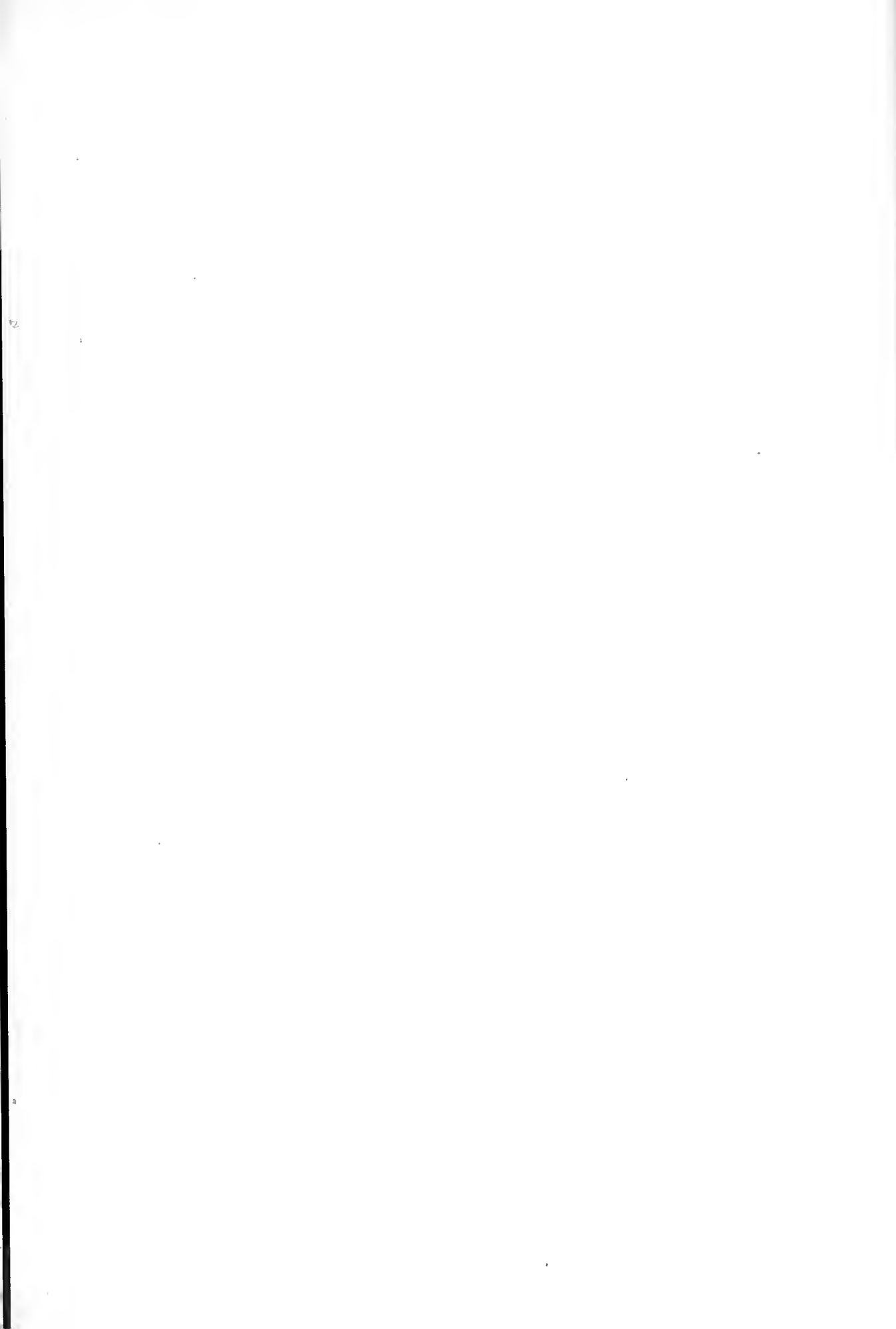
Fred. D. Bradford
Perry B. Swain

INVENTOR

Joseph E. Beatty

BY *Munn & Co.*

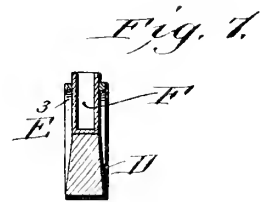
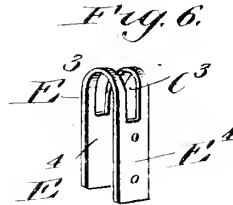
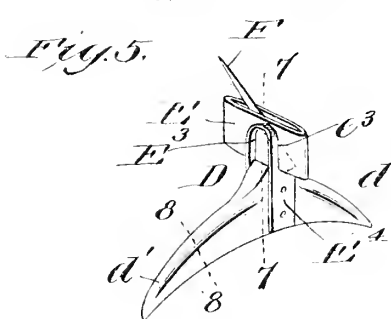
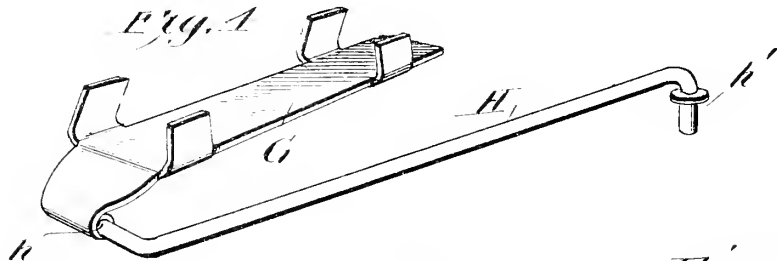
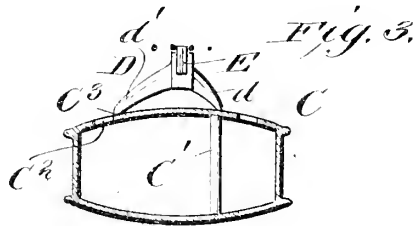
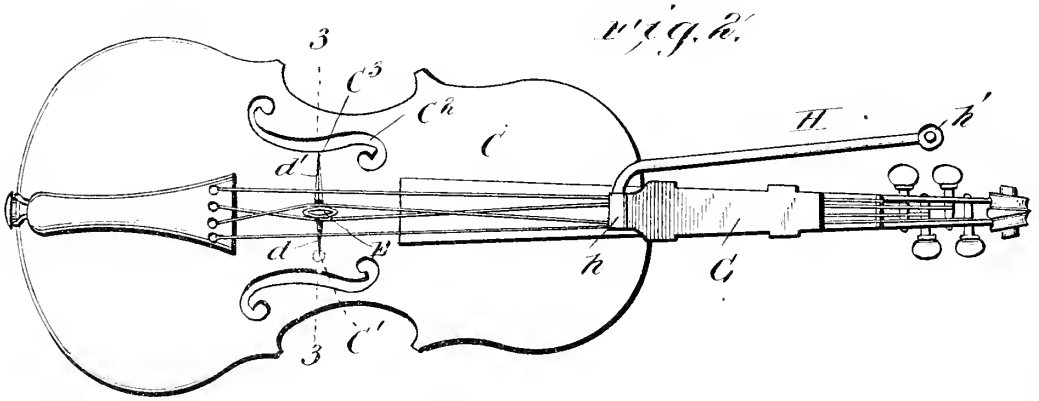
ATTORNEYS



J. E. BEATTY.
TALKING MACHINE.

APPLICATION FILED MAR. 31, 1904.

2 SHEETS—SHEET 2.



WITNESSES:

Fred. Bufford
Cory B. Surpin

INVENTOR:
Joseph E. Beatty
BY *Munn & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

JOSEPH E. BEATTY, OF HUNTINGDON, PENNSYLVANIA.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 787,264, dated April 11, 1905.

Application filed March 31, 1904. Serial No. 200,967.

To all whom it may concern:

Be it known that I, JOSEPH ELLIOTT BEATTY, a citizen of the United States, and a resident of Huntingdon, in the county of Huntingdon and State of Pennsylvania, have made certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention is an improvement in talking-machines, being in the nature of an attachment for use on talking-machines, especially relating to the employment of a violin as a sound-box or reproducer by turning such instrument upside down and employing a special form of bridge carrying the needle or stylus which operates in the record; and the invention consists in certain novel constructions and combinations of parts, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a perspective view of the apparatus as in use. Fig. 2 is a face view of the violin with the bridge and needle or stylus holder in place. Fig. 3 is a cross-section on about line 3 3 of Fig. 2. Fig. 4 is a perspective view of the holder. Fig. 5 is a detail perspective view of the needle-holder and bridge. Fig. 6 is a perspective view of the clevis for securing the needle-holder. Fig. 7 is a cross-section of the bridge and holder, the needle being removed on about line 7 7 of Fig. 5, and Fig. 8 is a detail cross-section on about line 8 8 of Fig. 5.

The motor may be of ordinary form and arranged in a box A, as shown, and the record B may be of the ordinary construction, that shown being a disk record revolving about a vertical axis.

The violin C may be an ordinary violin having a sounding-post C' and having on the opposite side of its center from the sounding-post C' the scroll C², which may be cut out, leaving a thin flange at C³, upon which rests one end of the bridge D, which latter carries the holder for the needle or stylus. This bridge D is of a special construction, being provided with the holder E at a point between its ends, having at one end or on one side of the holder the short arm *d* and having on the opposite side of the holder the relatively longer arm *d'*, the latter resting upon the scroll of the violin and the former, *d*, resting

approximately over the sounding-post, so the vibrations transmitted to the bridge from the record will be imparted to the long arm *d'* of the bridge and will be transmitted thence to the violin. I thus impart the vibrations to the violin by one end of the bridge, transmitting the vibrations to the thin scroll on one side of the instrument, and the sound-waves spreading from that part of the instrument throughout the violin. This is important, as by arranging the bridge to transmit the vibrations to one side of the violin or from one end only of the bridge I avoid any interference of sound-waves such as might result from transmitting the vibrations from both ends of the bridge to the body of the violin. For securing the holder to the bridge I prefer to employ the clevis E², (shown in Fig. 6,) being a plate bent into U form, slotted in its crown at *e*³ to receive the holder E, and having the depending legs E⁴, which extend on opposite sides of and are secured to the bridge, as shown in Fig. 5 of the drawings. In practice I locate the point of the needle in about the line where the bow acts upon the strings of the violin as ordinarily played.

The holder E for the needle or stylus is elongated in a direction at a right angle to the direction of the length of the bridge and stands thus at a right angle to the bridge, being secured at its middle to the bridge, so it will project equally on opposite sides of the bridge in order that the needle may occupy the same relation to the bridge when adjacent to one end or the other of the holder in the use of the invention. This holder is of a special construction, being widened at its middle and tapering thence toward its opposite ends, so that if the needle F be placed in the holder and rocked thence toward one or the other end of the holder the point of the needle will be clamped in the outer end of the holder at one side of the latter, while the butt of the needle will be clamped at the inner end of the holder at the opposite side of such holder, so that the needle may be clamped both at its inner and outer ends, and thus held firmly in place, so it can be conveniently reversed, being held at either side of the holder, and being when so held set at the proper angle or slant

necessary for use on the records of talking-machines. By providing this novel construction for reversing the needle in its holder the needle after being used on one side of a record
 5 can be reversed in its holder and the reproducer then shifted to the opposite side of the center of the record, thus providing a fresh point for use, as will be understood by those skilled in the art. I prefer this form of holder
 10 because it enables me to secure the needle or stylus without the intervention of separate clamping devices therefor, the holder being so formed as to secure and clamp the needle in the use of the invention.

15 For securing the violin I employ a holder comprising a body G, which has at one side a receiver for the neck of the violin, such receiver being tapered longitudinally to conform to the taper of the violin-neck and undercut
 20 transversely, so it will grip the neck of the violin when pushed down thereon toward the body of the instrument, as will be understood from the drawings. A swinging rod H is pivoted
 25 at one end to the violin-holder at *h* and at its other end at *h'* to the bracket A, which extends from the motor-box, so the violin may rock slightly up and down at *h* and may swing at *h'* in following the record of the talking-machine.

30 In securing the bridge I may employ a single spring leading from the needle-holder toward the neck and tailpiece of the violin, or I may secure such bridge by the ordinary violin-strings, so the violin can be removed from
 35 the talking-machine, a violin-bridge applied, and the instrument be played in the ordinary manner.

Having thus described my invention, what I claim as new, and desire to secure by Letters
 40 Patent, is—

1. The combination of a talking-machine, a violin having a sounding-post and a scroll on the opposite side of the instrument from said
 45 post, the bridge provided between its ends with a needle-holder elongated transversely the direction of length of the bridge and tapering toward both ends whereby to clamp the needle or stylus when the same is rocked therein, the needle or stylus in said holder
 50 and arranged to be reversed from end to end therein, the said holder being located relatively nearer one end of the bridge whereby the bridge is formed with a short arm resting approximately over the sounding-post of the
 55 violin and with a relatively longer arm resting upon the scroll at the opposite side of the instrument from said sounding-post, the vio-

lin-holder having a receiver for the neck of the violin, said receiver being tapered longitudinally and undercut transversely to properly
 60 grip the violin-neck, the swinging rod pivoted at one end to the violin-holder, and the bracket on the talking-machine to which the other end of the swinging rod is pivoted substantially as set forth. 65

2. A reproducer for talking-machines comprising a violin, a bridge thereon and a needle or stylus carried by the bridge to operate in connection with a talking-machine record.

3. In a reproducer for talking-machines, a
 70 bridge provided between its ends with a needle-holder, the latter being located to one side of the middle of the bridge whereby the bridge is formed with a short arm at one end and with a relatively longer arm at the other end
 75 substantially as set forth.

4. The combination in an attachment for talking-machines with a violin having a sounding-post at one side of its center, and a scroll
 80 provided at one side of its middle with a holder for the needle or stylus whereby there is provided a short arm at one end of the bridge resting over the sounding-post of the
 85 violin and a relatively longer arm at the other end of the bridge resting upon the scroll opposite the sounding-post to transmit vibrations thereto in the operation of the device substantially as described.

5. In a reproducer for talking-machines a
 90 bridge provided between its ends with a needle-holder which is elongated in a direction at a right angle to the direction of length of the bridge substantially as described.

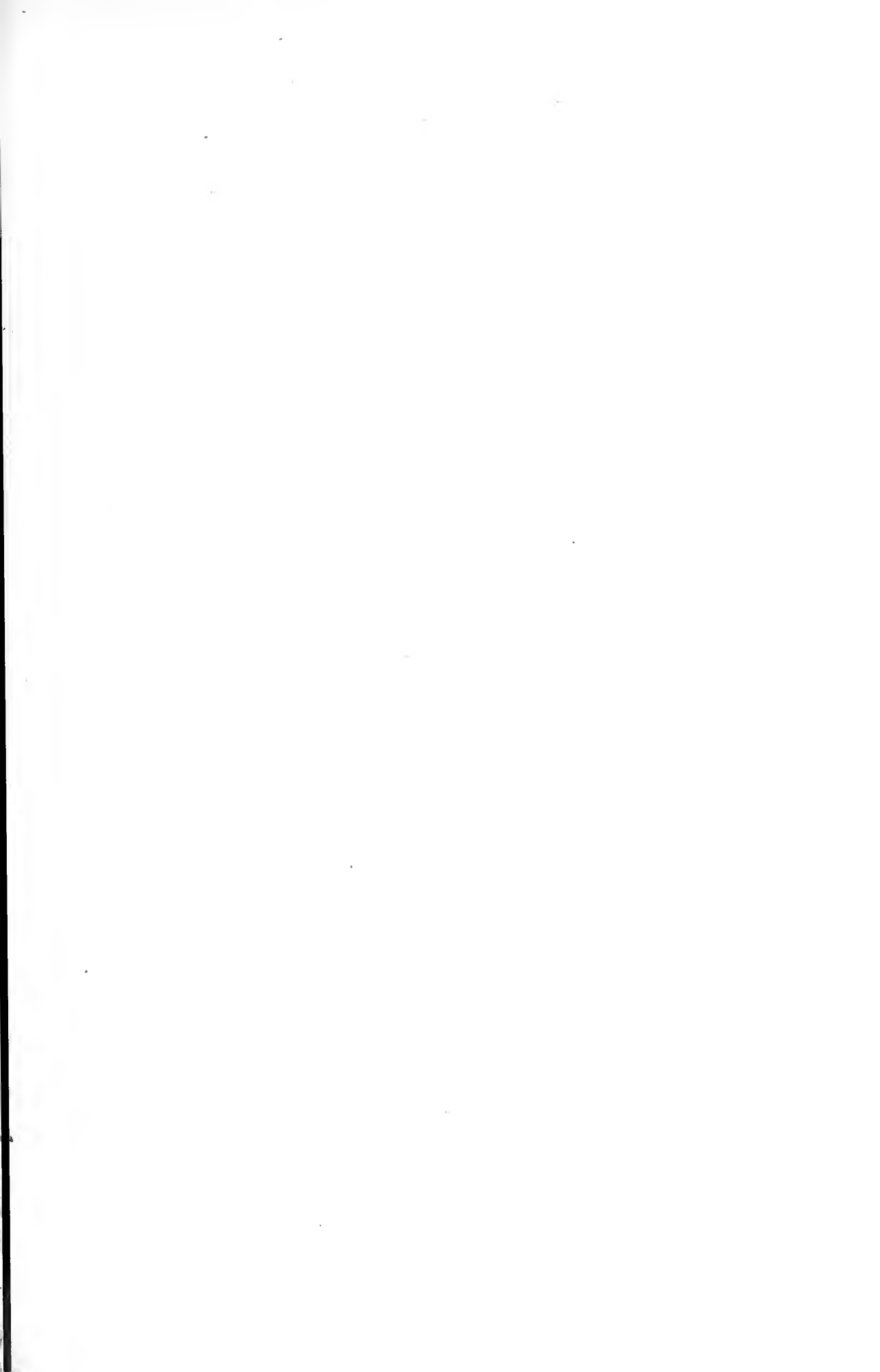
6. A bridge for talking-machines provided
 95 between its ends with a needle-holder arranged at a right angle to the direction of length of the bridge and located to one side of the middle of the bridge whereby the bridge is formed
 100 with a short arm at one end and with a relatively longer arm at the other end substantially as set forth.

7. In an attachment for talking-machines, a holder for a violin comprising the body portion having a seat for the neck of the violin,
 105 such seat being tapered longitudinally and undercut transversely, and a swinging rod pivoted to one end of the said body substantially as set forth.

JOSEPH E. BEATTY.

Witnesses:

SOLON C. KEMON,
 PERRY B. TURPIN.



No. 787,623.

PATENTED APR. 18, 1905.

D. J. HOOD.
DEVICE FOR HANDLING TALKING MACHINE NEEDLES.
APPLICATION FILED JULY 6, 1903.

Fig. 2.

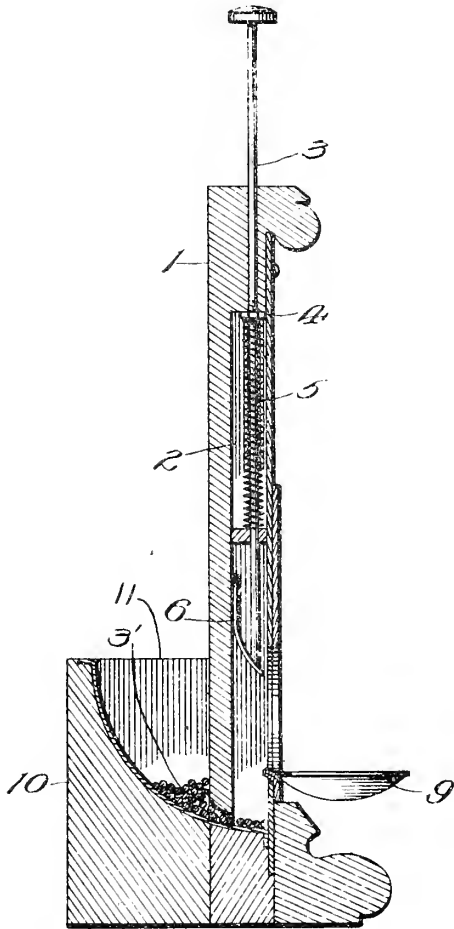
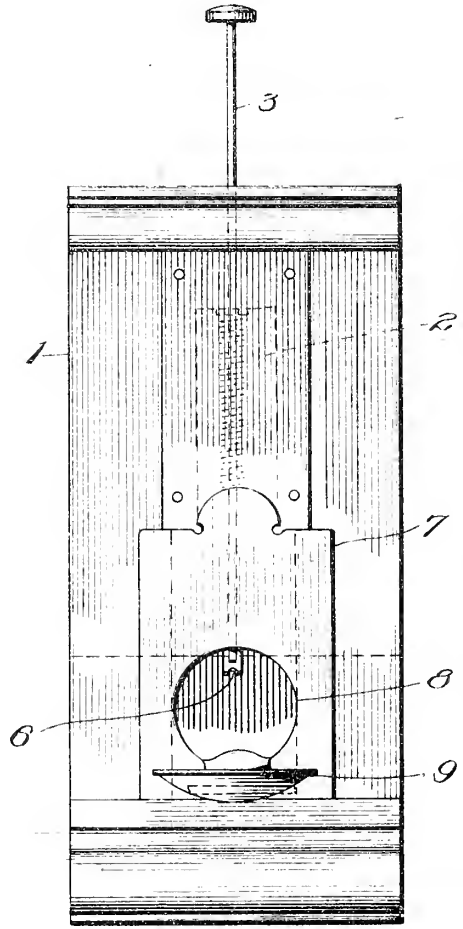


Fig. 1.



WITNESSES:

W. J. Hartman
Charles Bennett

INVENTOR

Delaware J. Hood.

BY

Wm. P. ...

ATTORNEY.

UNITED STATES PATENT OFFICE.

DELAWARE J. HOOD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

DEVICE FOR HANDLING TALKING-MACHINE NEEDLES.

SPECIFICATION forming part of Letters Patent No. 787,623, dated April 18, 1905.

Application filed July 6, 1903. Serial No. 164,278.

To all whom it may concern:

Be it known that I, DELAWARE J. HOOD, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Devices for Handling Talking-Machine Needles, of which the following is a full, clear, and complete disclosure.

The object of my invention is to produce a device which will obviate the necessity of withdrawing talking-machine needles from boxes or other receptacles in which they are placed by means of the fingers.

In talking-machines of the disk type it is usual and necessary to change the needle or stylus-point after each selection has been played, because of the fact that the points are slightly worn or ground off and would more or less injure a record-groove should the same be used a second time to produce the same or a different selection. Talking-machine needles being small and having a sharp end, they are difficult to pick up singly by the fingers, but when once held in the fingers may be easily inserted into the stylus-bar. The device which is the subject-matter of the present invention overcomes this difficulty by depositing the needles separately in a shallow tray, from which they may be easily removed.

Briefly, my invention comprises a magnet movably mounted upon a suitable base or upon the casing or cabinet of a talking-machine and which is adapted to remove needles successively from a receptacle, also carried by said support, and to deposit said needles in a suitable place or holder, so that they may be easily grasped by the fingers.

For a full, clear, and exact description of my invention reference may be had to the following specification, and to the accompanying drawings, forming part thereof, in which—

Figure 1 is a front elevation of my device, showing the same in connection with a portion of a casing for a talking-machine motor; and Fig. 2, a longitudinal sectional view of the device as shown in Fig. 1.

Referring to the drawings, the numeral 1

indicates a portion of the casing for the talking-machine motor, said casing having a recess 2 therein, which at its lower portion forms a receptacle for the needle and communicates with the interior of said casing, as indicated at 3'. Within the recess 2 a magnetic rod or pin 3 is located in such a manner that the same may reciprocate vertically, said pin being adapted to be retained in a raised position by a collar 4 and coil-spring 5. Said rod 3 is preferably magnetized for its whole length, but may consist of two portions, one of which only is magnetized. Within the recess 2 adjacent its lower portion a curved spring 6 is provided which has a notch or recess 7 at its lower end. This spring is fastened to the inner wall of said recess, and its lower notched end projects into the path of the magnetic rod 3, so that when said pin is in its raised position said spring 6 will project slightly below its end.

The recess 2 in the casing 1 is covered in any suitable manner; but at its lower end I have shown a plate 7', having an opening 8 therein, to the lower edge of which is attached the shallow pan or receptacle 9. The opening 3' in the casing 1 is adapted to cooperate with a recessed block 10, so as to form a wedge-shaped receptacle or hopper for the talking-machine needles, as indicated at 11.

In the operation of my device the recess or hopper 11 in the block 10 is filled or partially filled with talking-machine needles which are to be used upon the sound-box in the usual manner. These needles pass to the lower part of the said hopper, and several of them pass through the opening 3' into the lower end of the recess 2, which in this position are in alinement with the end of the magnetic rod 3. When it is desired to obtain a new needle, the magnetic pin or rod 3 is depressed until its end attracts one of said needles, and said pin is then allowed to move upwardly until the end of the spring 6 has passed over the end of said magnetic pin, thereby disengaging the needle therefrom and at the same time giving it a slight impulse outwardly, so that it will be deposited

in the pan 9. The needle then may be easily grasped by the fingers and placed within the stylus-bar of the sound-box.

The spring 6 is preferably of brass or other ordinary non-magnetic material, as are also the other parts, excepting the rod or pin 3.

Changes may be made in the form, proportion, and arrangement of my device without departing from the spirit and scope of my invention. The magnetic portion of the device may be made to reciprocate in any direction which may suit choice or convenience and also may be made in different forms which will be substantially equivalents of that herein shown, so long as the reciprocating selecting feature is retained.

Having thus described my invention, what I claim, and desire to protect by Letters Patent of the United States, is—

20 1. A device for handling talking-machine needles, comprising a support, a magnetic selector movably carried thereby and a receptacle adjacent said support, which said selector is adapted to enter to successively remove
25 needles therefrom.

2. A device for handling talking-machine needles, comprising a support, a magnetic selector movably carried thereby, a hopper adjacent said support, and a receptacle adapted
30 to receive needles from said hopper, said selector being adapted to enter said receptacle and to successively remove needles therefrom.

3. A device for handling talking-machine needles, comprising a support, a magnetic selector movably carried thereby, a receptacle fixed to said support with which said selector
35 is adapted to cooperate to successively remove needles therefrom and means for detaching needles from said selector.

40 4. A device for handling talking-machine needles, comprising a support or casing, a magnetic selector carried by said support and adapted to reciprocate thereon, a receptacle carried by said support and adapted to have
45 the needles removed therefrom by said selector, means for detaching needles from said selector and a secondary receptacle adapted to receive the needles when detached from said selector.

50 5. A device for handling talking-machine needles, comprising a support or casing, a magnetic selector carried thereby and adapted to reciprocate thereon, a hopper, a receptacle having communication with said hopper and
55 adapted to be entered by said selector to remove needles therefrom, a stripper for said selector, and a secondary receptacle adapted

to receive needles when detached from said selector.

6. A device for handling talking-machine
60 needles, comprising a part having a wedge-shaped recess, there being an opening in the lower portion thereof, means located adjacent said opening to receive needles therefrom, a magnetic selector adapted to withdraw the
65 needles from said part, means for detaching needles from said selector and a secondary receptacle adapted to receive said needles successively when detached from said selector.

7. A device for handling talking-machine
70 needles, comprising a support, a magnetic selector carried thereby, and adapted to reciprocate thereon, a spring having one end in contact with said selector so as to detach needles therefrom, a receptacle for the needles,
75 which said selector is adapted to enter, so that the needles are attracted and held thereby and a secondary receptacle for the needles.

8. A device for handling talking-machine
80 needles, in combination with the casing of a talking-machine, of a receptacle for said needles, means to permit needles to be delivered to the exterior of said casing, a magnetic selector attached to said casing and adapted to
85 cooperate with said means to successively remove needles therefrom.

9. A device for handling talking-machine
90 needles, in combination with the casing of a talking-machine, of a storage-receptacle for said needles located within said casing, said receptacle having communication with the exterior of said casing, means for receiving
95 needles from said storage-receptacle, a magnetic selector adapted to enter said receiving means and raising needles therefrom, means for detaching needles from said selector and a secondary receptacle for receiving the needles so detached.

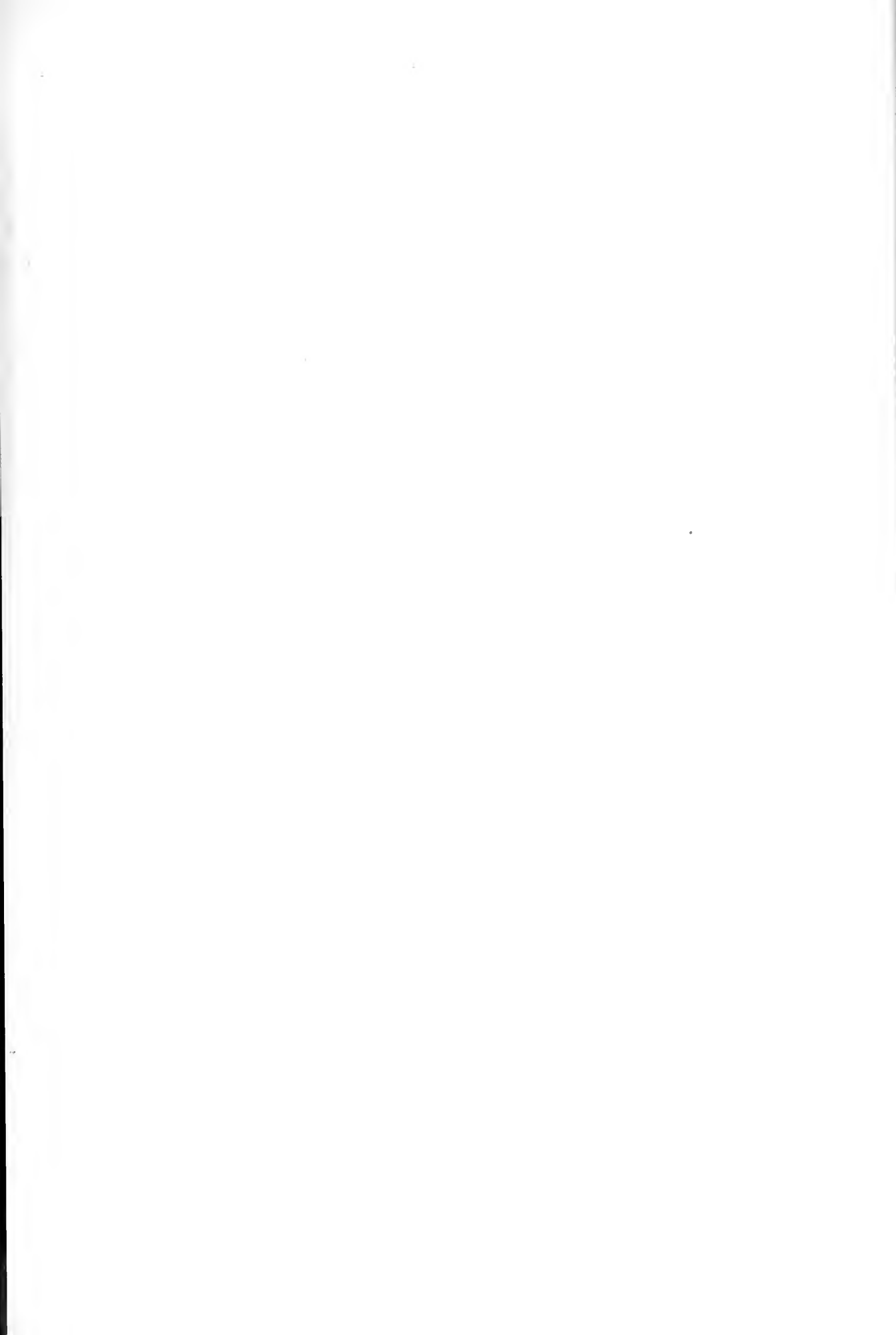
10. A device for handling talking-machine
100 needles, in combination with a casing of a talking-machine, of a needle-receptacle attached thereto, a magnetized bar also attached thereto and adapted to reciprocate thereon, a spring for holding said bar in its inoperative
105 position, said bar being adapted to cooperate with said receptacle to successively remove the needles therefrom.

In witness whereof I have hereunto set my hand this 3d day of July, A. D. 1903.

DELAWARE J. HOOD.

Witnesses:

LEWIS H. VAN DUSEN,
CHAS. K. BENNETT.



No. 787,765.

PATENTED APR. 18, 1905.

E. A. IVATTS.
PHONOGRAPH.

APPLICATION FILED FEB. 16, 1904.

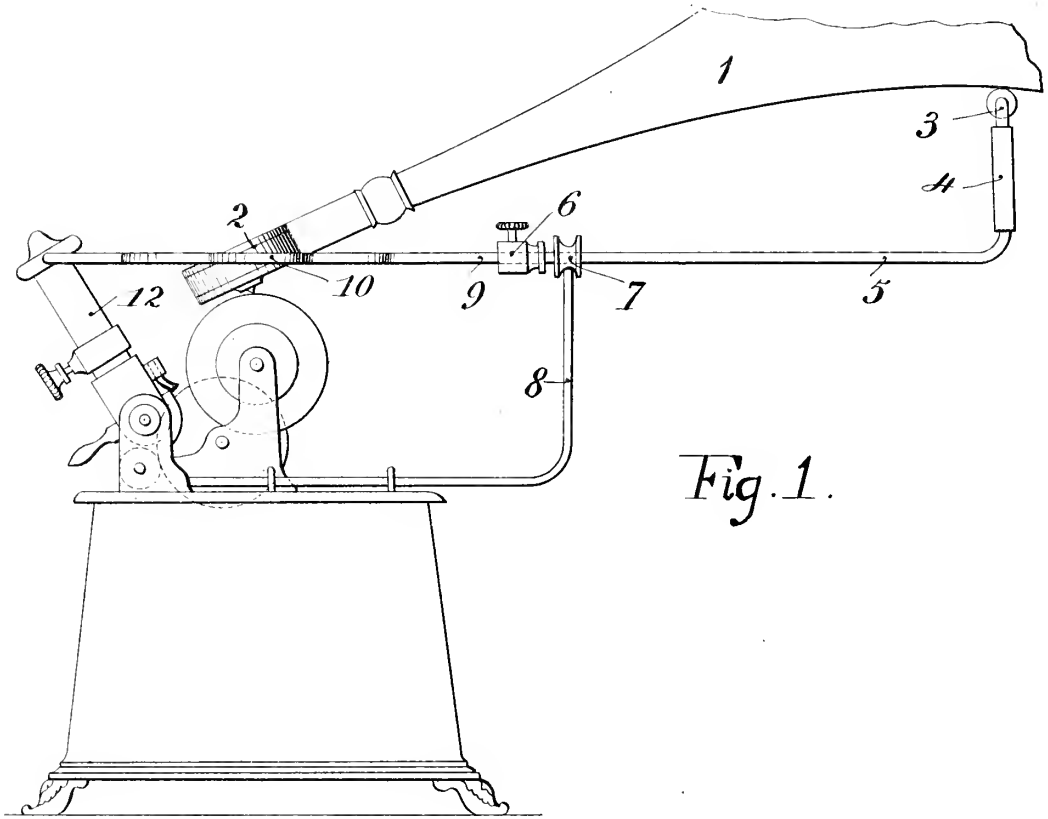


Fig. 1.

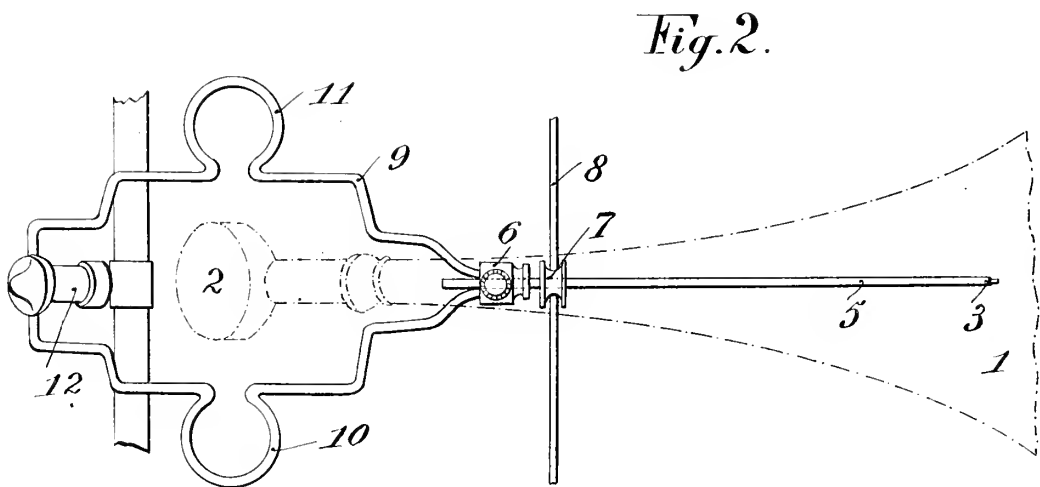


Fig. 2.

Witnesses
Randall H. Lumpy.
Waldo M. Chapin

Inventor
Ernest A. Ivatts
by Wm. R. Ransom Att'y.

UNITED STATES PATENT OFFICE.

ERNEST ALBERT IVATTS, OF PARIS, FRANCE, ASSIGNOR TO LA COMPAGNIE GÉNÉRALE DE PHONOGRAPHES, CINÉMATOGRAPHES & APPAREILS DE PRECISION, OF PARIS, FRANCE.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 787,765, dated April 18, 1905.

Application filed February 16, 1904. Serial No. 193,814.

To all whom it may concern:

Be it known that I, ERNEST ALBERT IVATTS, engineer, a citizen of Great Britain, residing at Paris, in the Department of the Seine, France, have invented new and useful Improvements in and Relating to Phonographs and the Like, of which the following is a specification.

The subject of this invention is a movable support for the sound-horns of phonographs and like talking-machines.

The improved support is characterized by the feature that it is capable of movement and follows the movement of the diaphragm, which movement is facilitated by the use of a roller on a suitable part of the support. The bad effect of a very long lever or arm on the receiving or recording diaphragm is thus avoided.

In the drawings forming part of this specification, Figure 1 is an elevation of the support shown applied to an ordinary phonograph, and Fig. 2 is a plan view of the same.

The horn 1, to which is attached the diaphragm 2 or the cell containing the same, carries a knuckle or the like joint or piece 3, capable of permitting the adjustment of the said horn in the vertical direction. The said knuckle-joint is made of two parts pivoted to each other, as shown, the upper part being secured or otherwise connected with the horn and the other part being held either rigidly or adjustably by screws or other convenient devices in a hollow socket or holder 4, which forms part of or is attached to the bar or rod 5. This bar or rod passes within a socket 6, which is furnished with a set-screw, so that the rod may be adjusted for the purpose of lengthening or shortening the support. On this bar is mounted a movable roller 7, running on the upper rail of the frame 8, fixed in any suitable manner to the frame of the phonograph. The upper bar of the frame 8 serves as a rail or runner to the roller 7 and should always be parallel to the axis of the record or like cylinder.

The bar 5 is adjustable in the end of the frame 9 and practically forms a part thereof.

Said frame may have the special form indicated by the drawings or may be of any other form which allows of the movement of the diaphragm in the middle of the frame in such a way that the diaphragm engages easily with the cylinder during its movements, and so that the protection for the cylinder, stylus, and diaphragm may be secured by making the diaphragm or the cell containing it rest in or on one of the loops or sides 10 or 11 of this support.

A cap or the like 12, suitably formed, causes the frame or support 9, and consequently the horn, to move longitudinally of the cylinder. The same is engaged by the traversing-screw of the apparatus, the pitch of the screw being in agreement with the helices or grooves of the cylinder. It will be plainly seen that when the cap moves synchronously with respect to the rotary movement of the cylinder it carries with it the frame or support 9, the bar 5, and the horn 1, and the effect of the very long arm or lever formed by this last and the vibrations caused by this displacement are avoided as a result of the bar 5 being held and moved by the roller 7 on the rail 8. It follows, therefore, that the stylus of the diaphragm will follow faithfully all the details of the grooves upon the record-cylinder by reason of the elimination of all lateral vibrations common with supports now in use, and the maximum correctness of rendering can be thus obtained from the apparatus without perversion of the recorded sounds.

It will be evident that the principle of this support can be equally well applied to the recording of sounds as to their reproduction.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A support for the horn of a phonograph mounted for movement longitudinally of the cylinder, the support being hollow for the reception of the diaphragm, and having an arm or extension thereon for the support of the horn at its enlarged end.

2. A support for the horn of a phonograph

mounted for movement longitudinally of the cylinder, the support being hollow for the reception of the diaphragm, and having an arm or extension thereon for the support of
5 the horn at its enlarged end, and a bearing on which said support rolls at a point intermediate its ends.

3. A support for the horn of a phonograph
10 mounted for movement longitudinally of the cylinder, the support being hollow for the reception of the diaphragm, and having an arm or extension thereon for the support of

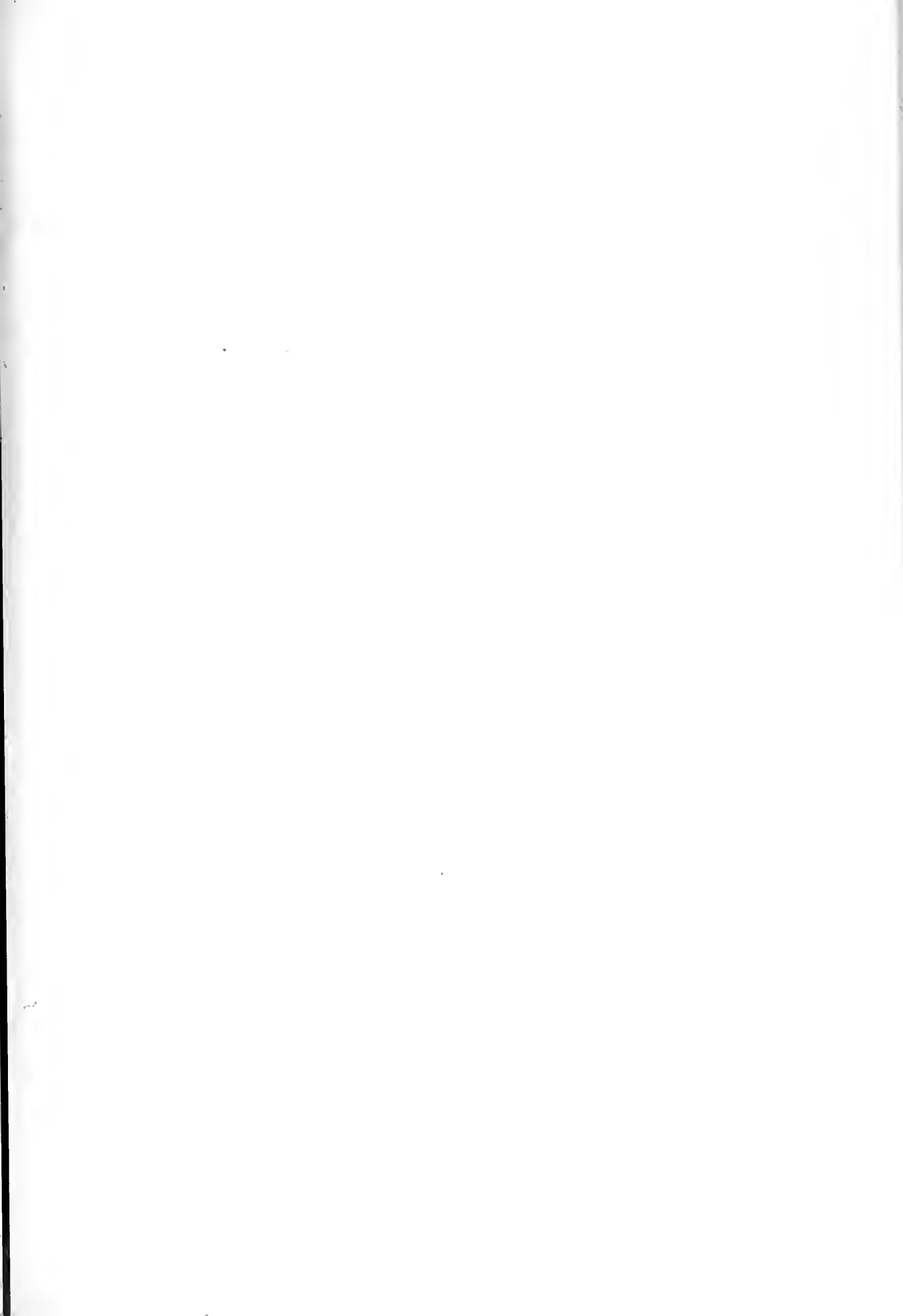
the horn at its enlarged end, a roller carried by said support at a point intermediate its ends and a supporting-rail on which said roller
15 bears.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERNEST ALBERT IVATTS.

Witnesses:

HANSON C. COXE,
HENRY DANBERY.



No. 787,854.

PATENTED APR. 18, 1905.

A. J. MUNDY & J. B. MILLET.

METHOD OF FINDING THE DIRECTION OF SOUND.

APPLICATION FILED AUG. 20, 1904.



Fig. 1.



Fig. 2.

WITNESSES=

M. V. Foley.

Don Dolan.

INVENTORS=

Austin J. Mundy

James B. Millet

J. C. ...
their attorneys.

UNITED STATES PATENT OFFICE.

ARTHUR J. MUNDY AND JOSIAH B. MILLET, OF BOSTON, MASSACHUSETTS.

METHOD OF FINDING THE DIRECTION OF SOUND.

SPECIFICATION forming part of Letters Patent No. 787,854, dated April 18, 1905.

Application filed August 20, 1904. Serial No. 221,481.

To all whom it may concern:

Be it known that we, ARTHUR J. MUNDY and JOSIAH B. MILLET, citizens of the United States, and residents of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Methods of Finding the Direction of Sound, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to submarine signaling—that is, to the making and receiving of sound-signals in water; and it consists in a method of ascertaining on a moving vessel by means of sound-waves traversing the water the direction which the source of such sound-waves bears to the moving vessel. The sound-signals may be communicated to the water at any submerged point. The signals may be of any character, and the sound-waves communicated to the water radiate from the signaling apparatus and are of a length dependent upon the pitch of the fundamental note of the signaling apparatus. Various means have been devised for receiving on a vessel at a distance from the submerged signaling apparatus the vibrations of said sound-waves.

The present invention relates to the method of using said sound-receiving devices or any sound-receiving devices upon a vessel while it is in motion and so that the direction of the signaling apparatus from the vessel may be readily ascertained. This is accomplished by employing two sound-receiving instruments, one at either side of the vessel near the stern or a similar pair near the bow, or both. When a pair of receivers are thus located near the stern, a slight swing of the vessel to port or starboard will quickly interpose a maximum of bulk between a signal which the vessel is approaching and one receiver and quickly expose the other receiver. If the signal be astern, then a swing of the vessel to port or starboard will slowly interpose a minimum of bulk between one receiver and the signal and slowly expose the other receiver. In

other words, the portion of the vessel forward of the sound-receiving instruments when the signal is ahead or the portion of the vessel aft of the sound-receiving instruments when the signal is astern is by swinging the vessel to port or starboard caused to be so interposed between one or the other of the sound-receiving instruments and the source of sound as to affect the degree or force of the vibrations or sound-signals which it receives and transmits. By comparing the force or values of the sound vibrations or signals received in any given position of the vessel by both receiving instruments, one on either side of the vessel, the direction of the signaling-station is readily determined and the general course of the vessel laid with relation thereto. When the receivers are arranged on the bow, a swing of the vessel exposes one receiver slowly to a signal ahead and slowly screens the other receiver therefrom by the interposition of the bulk of the vessel. If the signal is astern, one receiver is quickly screened from the signal by the turning of the vessel, while the other receiver is as quickly exposed thereto. For the best results two receiving instruments should be placed on opposite sides of the vessel at least a little more than one wave length of the dominant note of the sound-signal from one end of the vessel and about one wave length of said note from the keel, the location depending somewhat upon the construction of the vessel itself and the location of its machinery.

We will now describe the invention in conjunction with the drawings forming a part of this specification, wherein—

Figure 1 represents in diagrammatic form three positions of the vessel. Fig. 2 represents three positions of a vessel equipped with receiving instruments at the bow.

Any means for producing the submerged signals in the water may be used, and any instrumentality upon the vessel for receiving the signals from the water may be employed, and we therefore have not thought it necessary to indicate any special apparatus for accomplishing this purpose, but have referred

generally to patented apparatus that can be employed, although we would not be understood as confining ourselves to it.

5 It will be understood, of course, that it is desirable that each receiving instrument should be so connected with an observation-point on the vessel that the sounds from each shall be received simultaneously or successively by the observer.

10 The diagram of Fig. 1 shows how the vessel is swung to obtain the difference in values of the sound-signals received by the two instruments from one side or the other and whereby the difference in their respective
15 values between such points enables the direction of the point from which it emanates to be in the first place ascertained and in the second place to be followed, and this is true likewise of Fig. 2.

20 Having thus fully described our invention, we claim and desire to secure by Letters Patent of the United States—

1. The method of ascertaining the direction of a point from which submerged, sound-signals emanate, comprising the employing upon
25 a moving vessel of two sound-receiving instruments placed upon the side of a vessel near one end or the other thereof, but at a distance therefrom of at least the wave length of the
30 dominant note of the sound to be received, and causing said moving vessel to be turned in one direction or the other whereby the respective values of the two instruments in several positions of the vessel may be compared
35 with each other and the direction of the source of said sound-waves from the vessel be ascertained.

2. A method of ascertaining the direction of a point from which submerged sound-signaling waves emanate, comprising the employ-
40 ment of one or more sound-receiving instrumentalities upon the side of a moving ves-

sel near its end, but a distance therefrom of at least the wave length of the dominant note of the sound to be received, and the turning
45 of said vessel with respect to the signaling-waves to vary the effect, value or force of the vibrations of such waves upon the receiving instrument, as and for the purposes set forth.

3. A method of ascertaining the direction
50 of a point from which submerged sound-signaling waves emanate, comprising the employment of one or more sound-receiving instrumentalities upon the side of a moving vessel near its end, but a distance therefrom and
55 from the keel of the vessel of at least the wave length of the dominant note of the sound to be received, and the turning of said vessel with respect to the signaling-waves to vary the effect, value or force of the vibrations of
60 such waves upon the receiving instrument, as and for the purposes set forth.

4. The method of ascertaining the direction of a point from which submerged sound-signaling waves emanate, comprising the employ-
65 ment of two sound-receiving instrumentalities upon the side of a moving vessel near its end, but a distance therefrom of at least the wave length of the dominant note of the sound to be received, and the turning of the
70 vessel in various positions with respect to the signaling-waves to vary the effect, value or force of the vibrations of such waves upon the receiving instrumentalities until the said effect is equal upon both instrumentalities and
75 the direction thereof determined, as described.

ARTHUR J. MUNDY.
JOSIAH B. MILLET.

Witnesses to A. J. M.:

GEORGE O. G. COALE,

M. E. FLAHERTY.

Witnesses to J. B. M.:

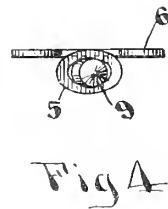
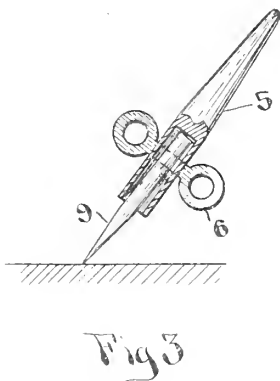
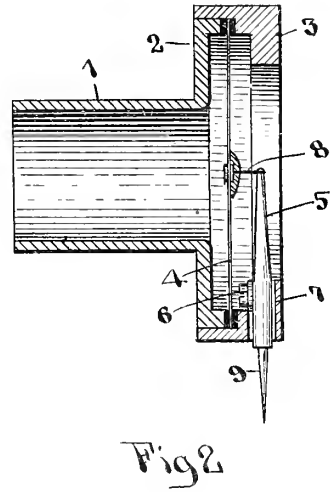
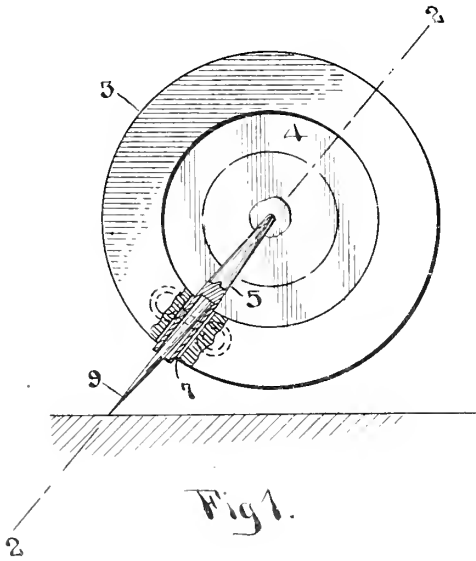
HORACE B. GALE,

ANNIE J. CONVERSE.

No. 788,281.

PATENTED APR. 25, 1905.

B. L. RINEHART.
DEVICE FOR SECURING SOUND BOX NEEDLES.
APPLICATION FILED MAR. 14, 1903.



WITNESSES:
Edu. W. Vaill Jr.
Chas. Bennett

INVENTOR:
Bentley L. Rinehart
by *John Pettit*,
ATTORNEY:

UNITED STATES PATENT OFFICE.

BENTLEY L. RINEHART, OF CAMDEN, NEW JERSEY, ASSIGNOR TO
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF
NEW JERSEY.

DEVICE FOR SECURING SOUND-BOX NEEDLES.

SPECIFICATION forming part of Letters Patent No. 788,281, dated April 25, 1905.

Application filed March 14, 1903. Serial No. 147,763.

To all whom it may concern:

Be it known that I, BENTLEY L. RINEHART, a citizen of the United States, and a resident of Camden, State of New Jersey, have invented certain new and useful Improvements in Needle-Holding Devices for Sound-Boxes, of which the following is a full, clear, and complete disclosure.

My invention relates to devices for securing the stylus or needle within the stylus-bar of sound-boxes of talking-machines and obviates the use of auxiliary fastening devices, such as thumb-screws and other similar means.

The object of my invention, broadly stated, is to provide an automatic fastening and retaining means for the stylus or needle of a sound-box whereby the needle may be simply inserted in the socket of the stylus-bar and will be retained therein while being placed on the record and will be clamped firmly while traversing the grooves of said record.

For a full, clear, and exact description of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a front elevation of a sound-box having a portion thereof in section and showing my improved needle-holding device applied thereto; Fig. 2, a central longitudinal section taken on the line 2 2 of Fig. 1; Fig. 3, a view of the stylus-bar, partly in section, with a needle held therein; and Fig. 4, an end view of the stylus-bar, showing the needle or stylus in position therein.

In the drawings, the numeral 1 indicates the sound-box tube, which has mounted upon one end a supporting-plate 2. This is adapted to receive the cylindrical portion of the sound-box 3, which holds the diaphragm 4 in place by suitable flanges.

The numeral 5 indicates the stylus-bar, which is substantially of the well-known form, but is preferably oval in shape instead of being cylindrical. The stylus-bar 5 is mounted upon the sound-box by the spring-supporting plate or strap 6 in the usual manner. The stylus-bar projects through an opening 7 in the rim of the sound-box and is connected at

its inner end with the diaphragm 4 by a suitable wire or other connection 8.

The stylus-bar 5 instead of having the usual cylindrical hole or socket is provided with a socket which is slightly larger on one diameter than on the other, the longer diameter extending in a plane parallel to that of the diaphragm 4. The shorter diameter of the socket is very slightly greater than that of the needle or stylus, and from this shorter diameter the socket tapers slightly both ways transversely, or, in other words, the sides of the socket converge toward the end of its longer diameter. This construction forms a double-wedge-shaped opening or socket running longitudinally of the stylus-bar and is of the same size and shape throughout its length. It will now be seen that when the stylus or needle 9 is inserted in the double-wedge socket and the needle is brought into contact with the record with sufficient force or pressure to produce the sound-waves in the usual manner the needle or stylus will be cramped within the wedge-shaped opening or socket, the lower part of the cylindrical portion of the needle being forced upwardly and the upper end of the needle being forced downwardly in the opposite direction about the lower end of the socket at a fulcrum, so that each of said portions will be held firmly by the opposite tapering or wedge-shaped sides of the socket. This manner of holding the needle prevents the needle or stylus from moving transversely independently of the stylus-bar and obviates any looseness which may be produced by the transverse motion of the stylus-bar caused by vibrations due to the zigzag shape of the groove of the sound-record. It is desirable that the needle should be held in position after the same has been inserted and before its point has been brought into contact with the sound-record. For this purpose I magnetize the stylus-bar 5, which is usually made of iron or steel. The needle or stylus 9 also being made of steel the lines of force of magnetization follow both the needle and the stylus-bar, and therefore hold the needle in position within the socket. As soon as the needle is placed

in contact with the record the cylindrical portions thereof are forced into the respective parts of the wedge-shaped socket and the magnetism becomes no longer necessary. When it is desired to remove the needle from the stylus-bar, all that is necessary is to disengage the same from the wedge-shaped portions of the socket, whereupon the needle may be easily withdrawn.

I do not wish to be limited in the application of my invention merely to records of the zigzag type, for the same is also applicable to those of the vertically-undulating form.

Having thus described my invention, what I claim, and desire to protect by Letters Patent of the United States, is—

1. A talking-machine having a stylus-socket formed by fixed walls, said walls having a plurality of clamping-faces situated on opposite sides of, and at different points in, the length of the socket, and adapted for frictional engagement with opposite sides of the stylus at different points only in its length by a lateral movement of said stylus and adapted to hold the stylus against yielding when reproducing, and serving to operatively secure the stylus within said socket independent of any other securing means.

2. A talking-machine having a stylus-socket formed by fixed walls, and a removable stylus capable of lateral movement within said socket to bring said stylus into frictional engagement with the walls of the socket at a plurality of independent points, whereby said stylus is clamped by a lateral movement of itself, said frictional engagement serving to clamp the stylus against yielding when reproducing, and serving to operatively secure said stylus within said socket independent of any other means.

3. A sound-box for talking-machines having a stylus-socket provided with magnetic means and mechanical means for holding a stylus therein, said mechanical means serving to hold the stylus without yielding in a direction transverse to the diaphragm of the sound-box.

4. A sound-box for talking-machines having a stylus-socket provided with magnetic means for holding a stylus inoperatively, and mechanical means for holding the stylus operatively within said socket without yielding in a direction transverse to the diaphragm of said sound-box.

5. A sound-box for talking-machines comprising a stylus-socket, magnetic means for holding a stylus inoperatively within said socket and mechanical means for holding the stylus operatively within said socket without yielding in a direction transverse to the diaphragm of said sound-box.

6. A talking-machine having a wedge-shaped stylus-socket, the walls of said socket being magnetized.

7. A sound-box for talking-machines employing a record having a zigzag groove, said

sound-box having a stylus-socket formed by fixed walls, said walls having clamping-faces situated at different points in its length and on opposite sides of the socket for frictional engagement with a stylus to clamp the same without yielding in a direction transverse to the diaphragm of the sound-box.

8. In a talking-machine, a stylus-bar having a wedge-shaped socket therein, which is adapted to clamp the stylus or needle.

9. In a sound-box for talking-machines, a stylus-bar having a socket therein, said socket being formed at each end with a wedge-shaped portion, said wedge-shaped portion at one end being on the opposite side of the socket from the wedge-shaped portion at the other end.

10. In a talking-machine adapted to reproduce from a horizontally-disposed flat record having a record-groove with lateral undulations in the sides thereof, a sound-box having a stylus-socket, and a stylus in said socket, the axes of said socket and stylus being at an incline to said record when reproducing, the end portions of said socket having clamping-faces, frictionally engaging opposite sides of said stylus, the frictional engagement between said stylus and clamping-faces being maintained by the operative contact of the stylus and record in reproducing, and serving to prevent said stylus from yielding within said socket in a direction transverse to the diaphragm.

11. In a sound-box for talking-machines, a stylus-bar having a socket therein, the walls of said socket approaching each other so as to clamp the needle therein without yielding in a direction transverse to the diaphragm of the sound-box.

12. In a sound-box for talking-machines, a stylus-bar having a transversely wedge-shaped socket therein, which is adapted to clamp the stylus or needle.

13. In a sound-box for talking-machines, a stylus-bar having a socket therein which is double-wedge-shaped transversely and which is adapted to clamp the needle or stylus.

14. In a sound-box for talking-machines, a stylus-bar having a transversely double-wedge-shaped socket extending longitudinally thereof, said socket being of substantially the same size throughout its length and adapted to hold the needle or stylus therein by clamping the same at two points.

15. In a sound-box for talking-machines, a stylus-bar of magnetic material having a needle-receiving socket therein, said stylus-bar being magnetized to retain said needle in position within said socket, and means independent of said magnetic means for securing the needle in operative position within said socket.

16. In a sound-box for talking-machines, a stylus-bar having a socket therein, the walls of said socket approaching each other so as to clamp the needle therein without yielding in a direction transverse to the diaphragm of the

sound-box, said stylus-bar being magnetized to retain said needle in position.

17. In a sound-box for talking-machines, a stylus-bar having a transversely wedge-shaped socket therein, which is adapted to clamp the needle or stylus, said stylus-bar being magnetized to retain the needle or stylus in position when not otherwise held.

18. In a sound-box for talking-machines, a stylus-bar having a transversely double-wedge-shaped socket therein, which is adapted to clamp the needle or stylus, said stylus-bar being magnetized to retain the needle or stylus in position when not otherwise held.

19. In a sound-box for talking-machines, a stylus-bar having a transversely double-wedge-shaped socket extending longitudinally thereof, said socket being of substantially the same size and shape throughout its length and adapted to hold the needle or stylus therein by clamping the same at two points, said stylus-bar being magnetized to hold the needle or stylus in position when not otherwise held.

20. A reproducer for talking-machines, having a wedge-shape stylus-socket which is adapted to clamp the stylus or needle.

21. A reproducer for talking-machines, having a wedge-shape stylus-socket which is adapted to clamp the stylus or needle, the walls of said socket being magnetized.

22. In a talking-machine, a stylus-bar, having a stylus-socket formed by fixed walls, said walls being adapted to clamp a stylus without elasticity by a lateral movement of said stylus, and forming the sole means for holding a stylus operative therein when reproducing.

23. A talking-machine, having a stylus-socket formed by fixed walls which serve as the sole means for holding a stylus operative therein when reproducing, said walls being adapted to clamp a stylus by a lateral movement of the latter, the force holding said stylus in position being due to the frictional contact between the stylus and the socket-wall when the stylus is in operative contact with the record when reproducing.

24. A talking-machine adapted to reproduce from a flat record having a record-

groove with lateral undulations in the sides thereof, having a stylus-socket formed by fixed walls, the axis of said socket being at an incline to the record when reproducing, whereby the axis of a stylus inserted therein will also be at an incline to the record, the operative contact between the stylus and record serving to wedge the stylus by a lateral movement within said socket, and the frictional engagement between the walls of said socket and stylus serving as the sole means for holding the stylus operatively therein.

25. In a reproducer for talking-machines, a holder for the needle or stylus, having a wedge-shape socket therein adapted to clamp said needle or stylus.

26. In a reproducer for talking-machines, a holder for the needle or stylus, having a wedge-shape socket therein adapted to clamp said needle or stylus, said holder being magnetized.

27. In a reproducer for talking-machines, a holder for the needle or stylus which is tapered toward both ends, whereby the needle, when inserted in said holder and rocked toward either end thereof, may be clamped at its point end in the outer portion of one end of the holder, and at its butt-end in the inner portion of the opposite end of the holder, substantially as set forth.

28. In a reproducer for talking-machines, a diaphragm, and a stylus-bar for vibrating the same, having a stylus-socket formed by fixed walls, said walls being adapted to clamp a stylus without elasticity by a lateral movement of said stylus.

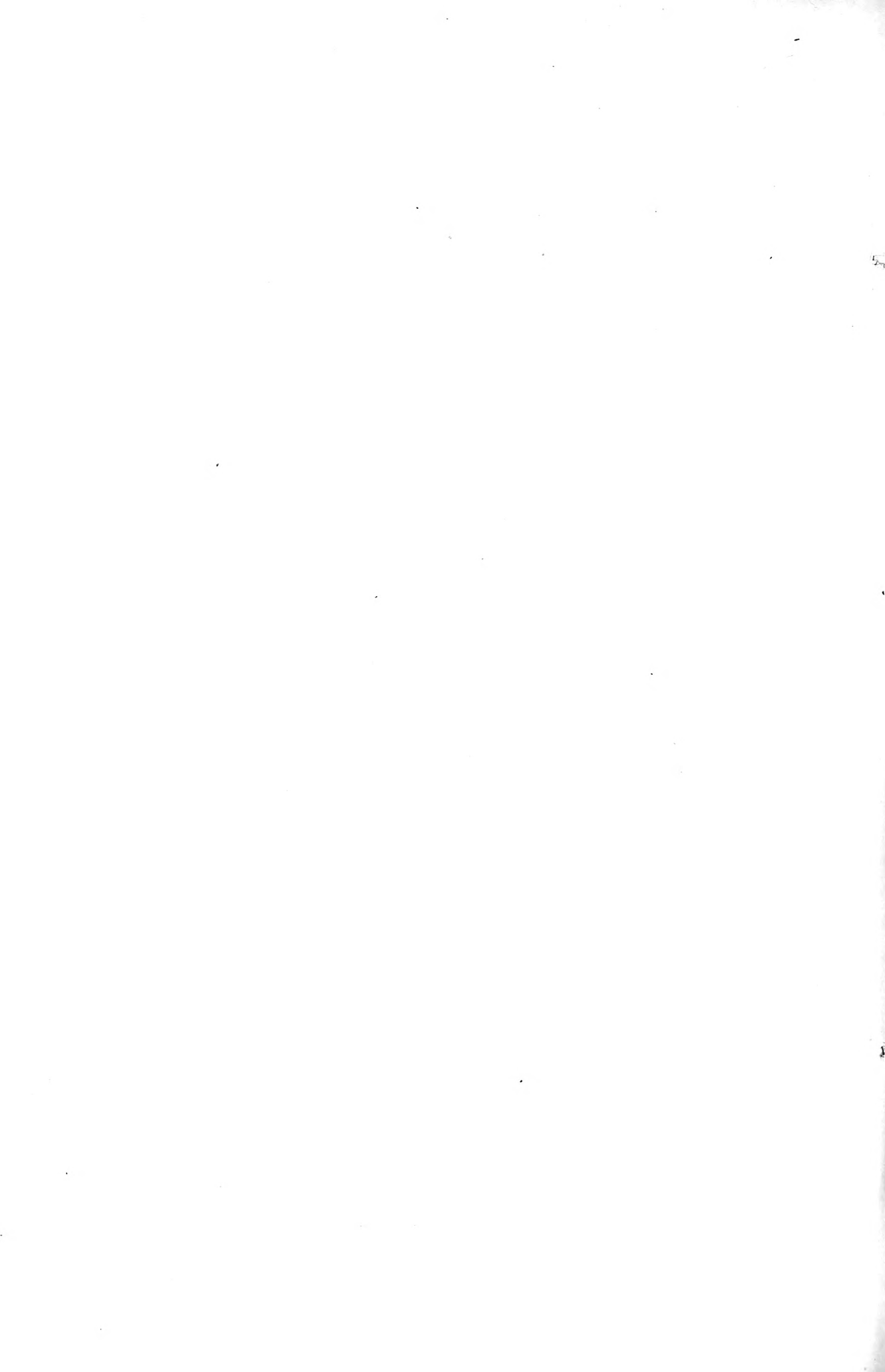
29. A sound-box for talking-machines, comprising a stylus-socket, means for holding a stylus loosely and inoperatively within said socket, and independent means for holding a stylus operatively within said socket.

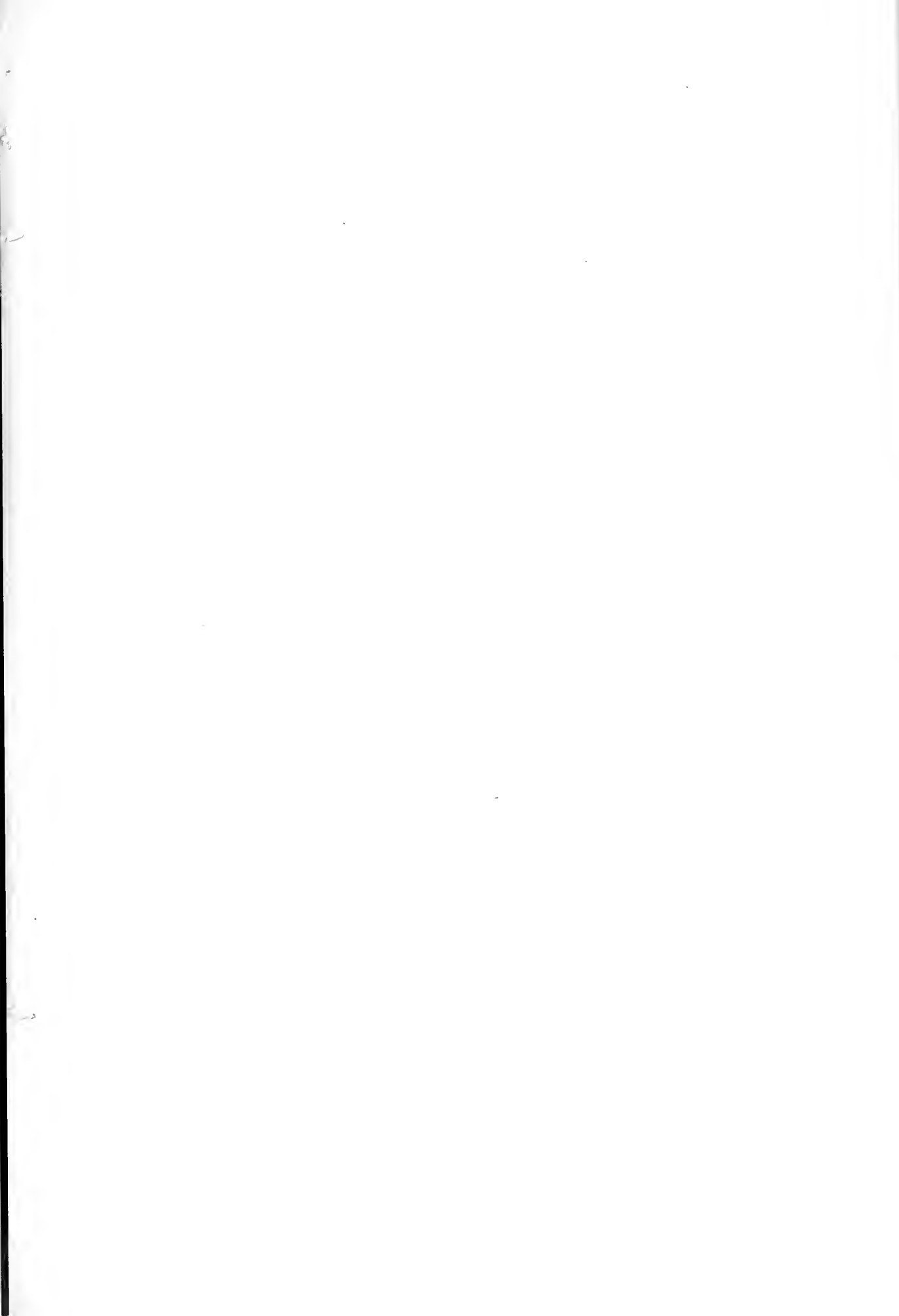
In witness whereof I have hereunto set my hand this 12th day of March, A. D. 1903.

BENTLEY L. RINEHART.

Witnesses:

EDW. W. VAILL, Jr.,
JOHN F. GRADY.

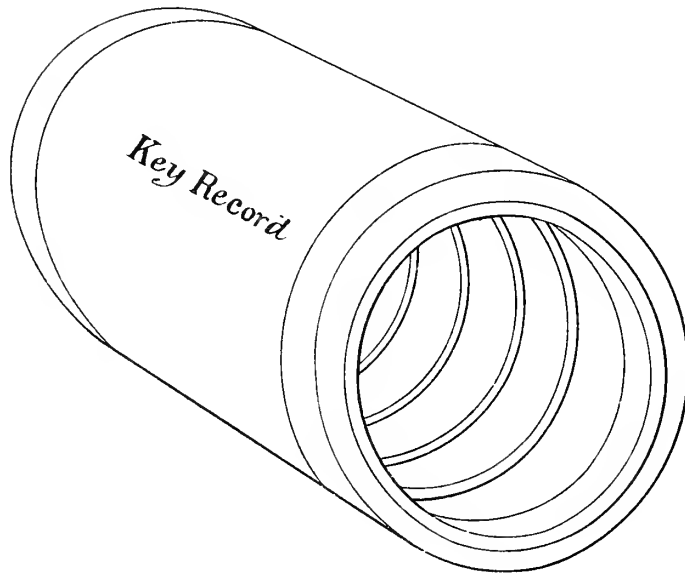




No. 788,927.

PATENTED MAY 2, 1905.

W. H. MILLER.
METHOD OF TUNING PHONOGRAPH CYLINDERS.
APPLICATION FILED MAY 10, 1904.



Attest:
Edgeworth Burns
Delos Holden

Inventor:
Walter H. Miller
by *Frank L. Allen* Atty.

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF TUNING PHONOGRAPH-CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 788,927, dated May 2, 1905.

Application filed May 10, 1904. Serial No. 207,233.

To all whom it may concern:

Be it known that I, WALTER H. MILLER, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Method of Tuning Phonograph-Cylinders, of which the following is a description.

In making phonograph-records for sale it is important that the masters from which duplicates are obtained should be secured at a standard surface speed, which at the present time with Edison records is about one hundred and sixty-four revolutions per minute. In this way when the reproducing-machine is properly adjusted musical selections can be reproduced in the exact key in which the original music was played in order that the best effects may be secured. If there is a relatively small difference in the surface speed of the masters, a perceptible variation in the key of the reproduction is observed, and to secure the best effect therefor a separate adjustment of the reproducing-machine would be required for each selection. Consequently it is commercially important that the masters should be obtained at the same surface speed, and it is therefore necessary that some effective way should be suggested by which the tuning of any phonograph or other talking-machines can be readily effected, whether for the taking of the masters or for the reproduction of the complete record.

My present invention presents a method of this character which has been successfully used in practice for some time.

Reference is hereby made to the accompanying drawing, which illustrates a key-record such as is herein described.

In carrying the invention into effect I first take a standard phonograph, for example, and adjust its regulating mechanism so that its mandrel will turn at the desired speed. This adjustment may be effected by timing the mandrel-shaft in the usual way and by carefully adjusting the regulating mechanism until the desired speed is obtained. I now place on this standard machine as so regulated an ordinary blank and record there-

on a certain selected sustained note—for instance, B-flat—which may be produced by a simple reed or in any other way. This note as so recorded is preferably sustained at a continuous volume and for a considerable time and may occupy substantially the entire record in order that the reproducer may be engaged with the record at any point to sound the standard note. The record so formed constitutes a key by which the tuning of other phonographs can be effected, and, if desired, it may be duplicated in any suitable way to obtain a large number of copies. When a phonograph has to be tuned, whether for recording or reproducing, one of the key records or duplicates thereof is placed on the phonograph and a reproducer engaged therewith, so as to sound a single continuous note. A reed keyed to the same pitch—for example, B-flat—is now sounded, and the adjusting mechanism of the phonograph is so regulated as to bring the note sounded by the phonograph in exact equality with the note sounded by the reed. When these two notes are exactly the same, the speed of the phonograph will correspond exactly to the standard speed of the original phonograph. This tuning can be effected with great accuracy, owing to the delicacy of the ear, and with great rapidity. Prior to my invention the tuning of phonographs was effected by counting the revolutions of the mandrel; but such an operation was tedious and relatively uncertain.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. The method of tuning phonographs or other talking-machines, which consists in adjusting a recording-machine to a standard speed, and then in recording on a blank operated by such talking-machine, a note of standard pitch sustained for a considerable time without interference with other notes to thereby obtain a key-record, as and for the purposes set forth.

2. The method of tuning phonographs or other talking-machines which consists in ad-

justing a recording-machine to a standard speed, then in recording on a blank operated by such talking-machine a note of standard pitch sustained for a considerable time without interference with other notes to thereby obtain a key-record, then in engaging a reproducing device of another talking-machine with the key-record, and in adjusting the latter talking-machine so that the pitch sounded

by the key-record corresponds with the original recorded note, as and for the purposes set forth. 10

Signed this 7th day of May, 1904.

WALTER H. MILLER.

In presence of—

FRANK L. DYER,

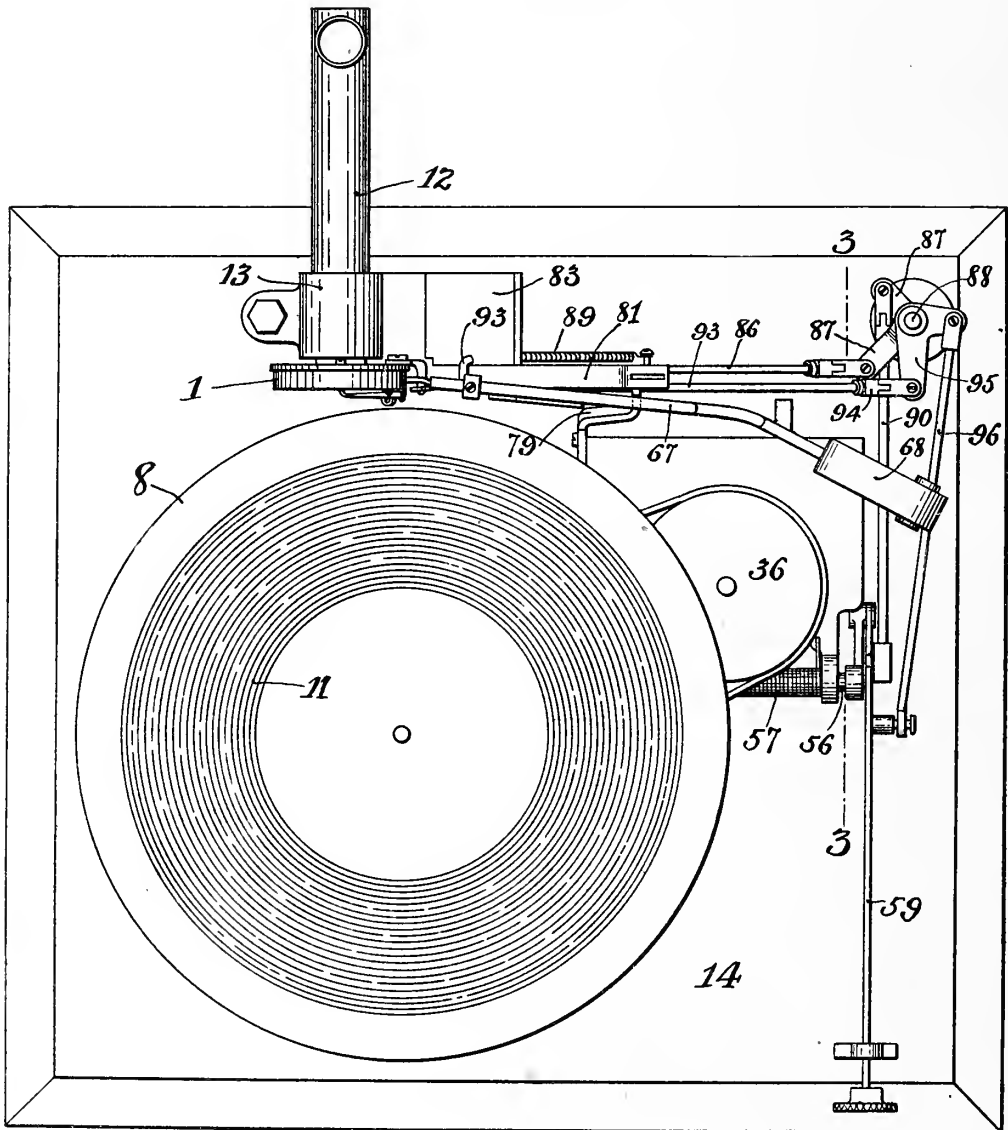
MINA C. MACARTHUR.



J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAR. 21, 1904.

6 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:
H. H. Leamy
H. Sample

INVENTOR
Julius Wellner
BY
A. V. Group
ATTORNEY.



J. WELLNER.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAR. 21, 1904.

5 SHEETS—SHEET 2.

Fig. 2.

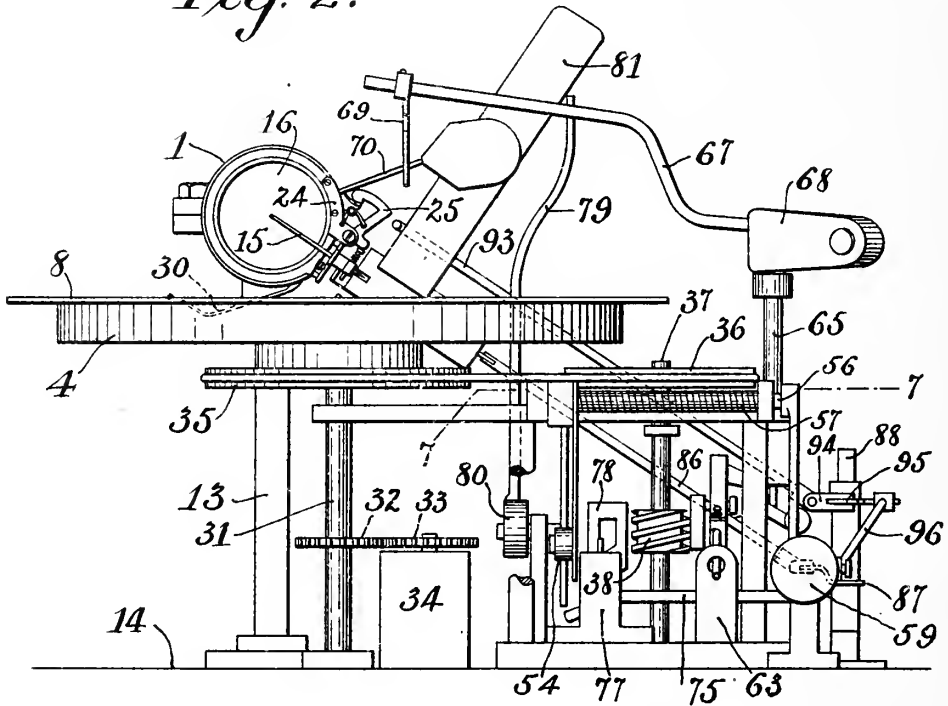
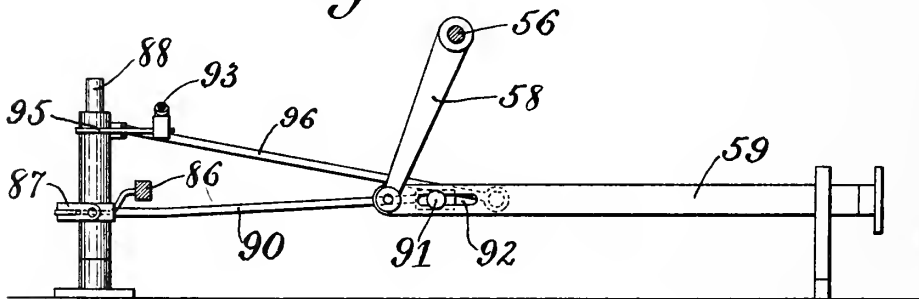
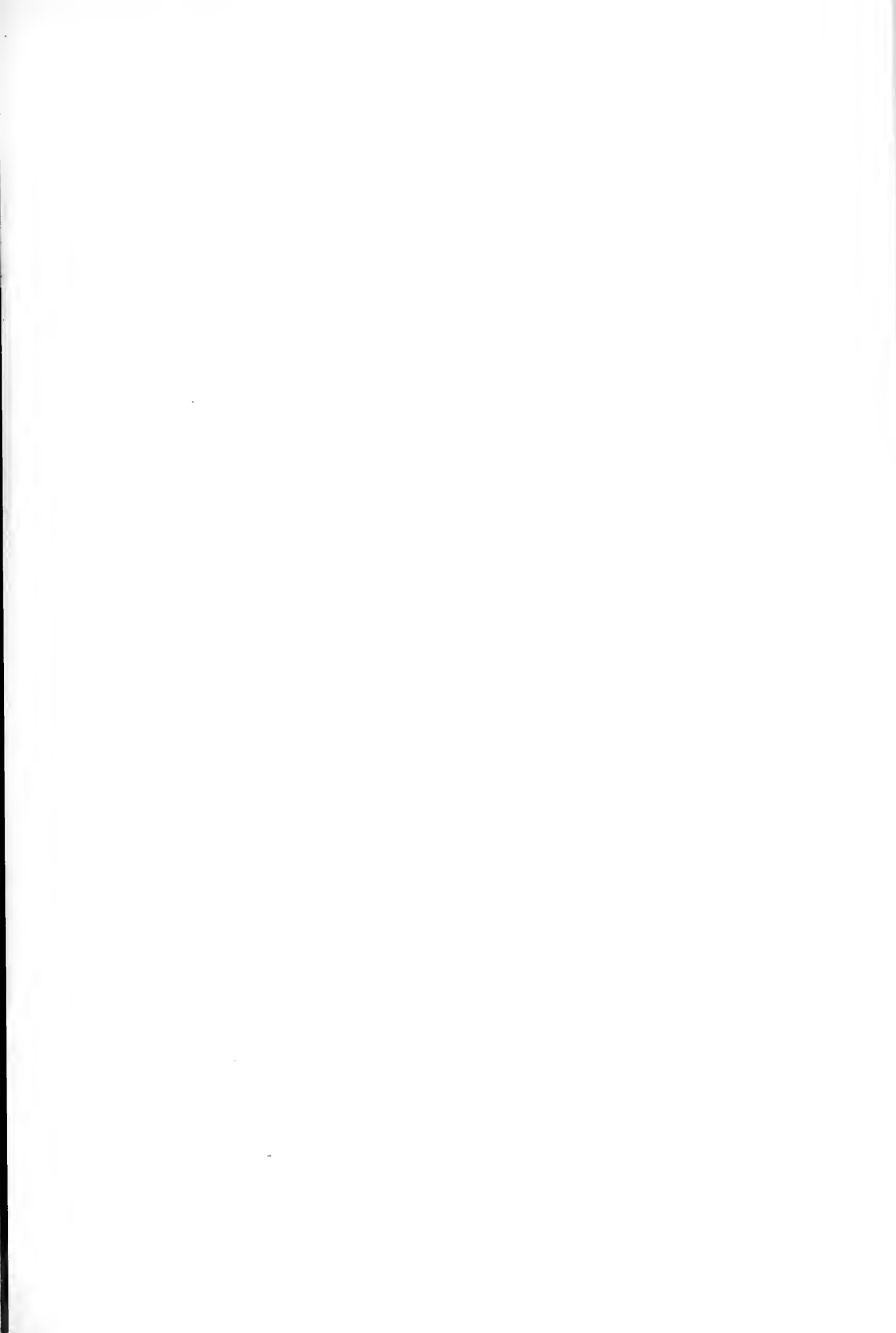


Fig. 3.



WITNESSES:
H. H. Leamy
J. H. Gamble

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Julius Wellner
 BY
A. V. Trout
 ATTORNEY.



J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAR. 21, 1904.

Fig. 4.

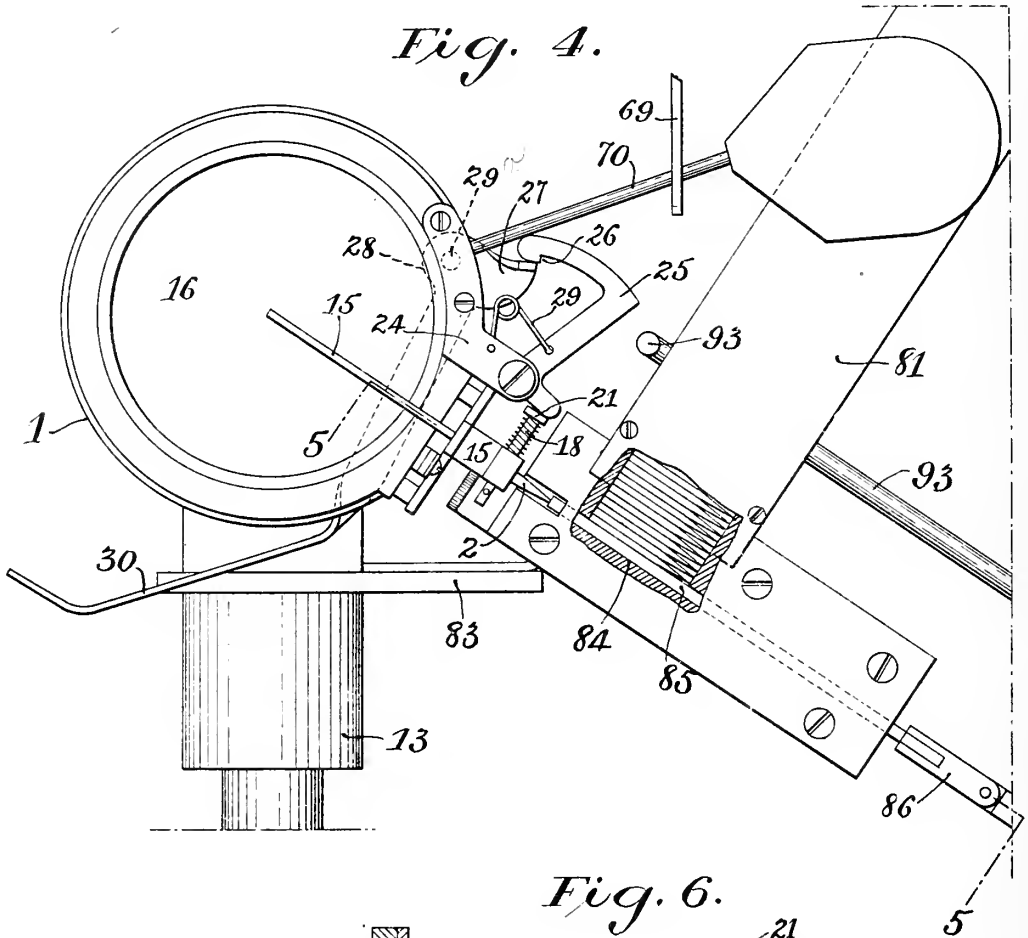
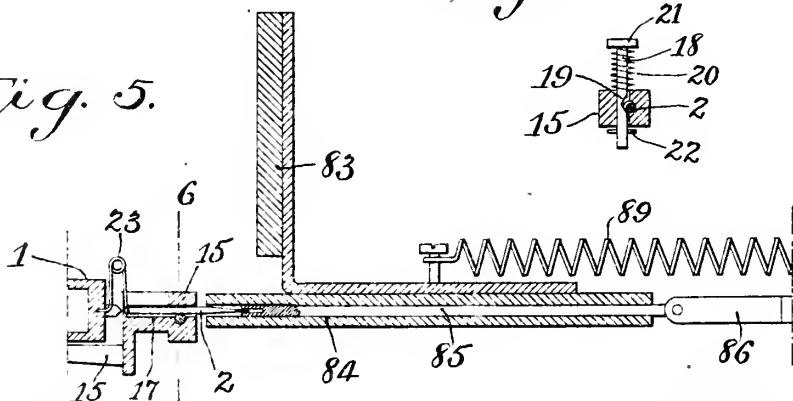


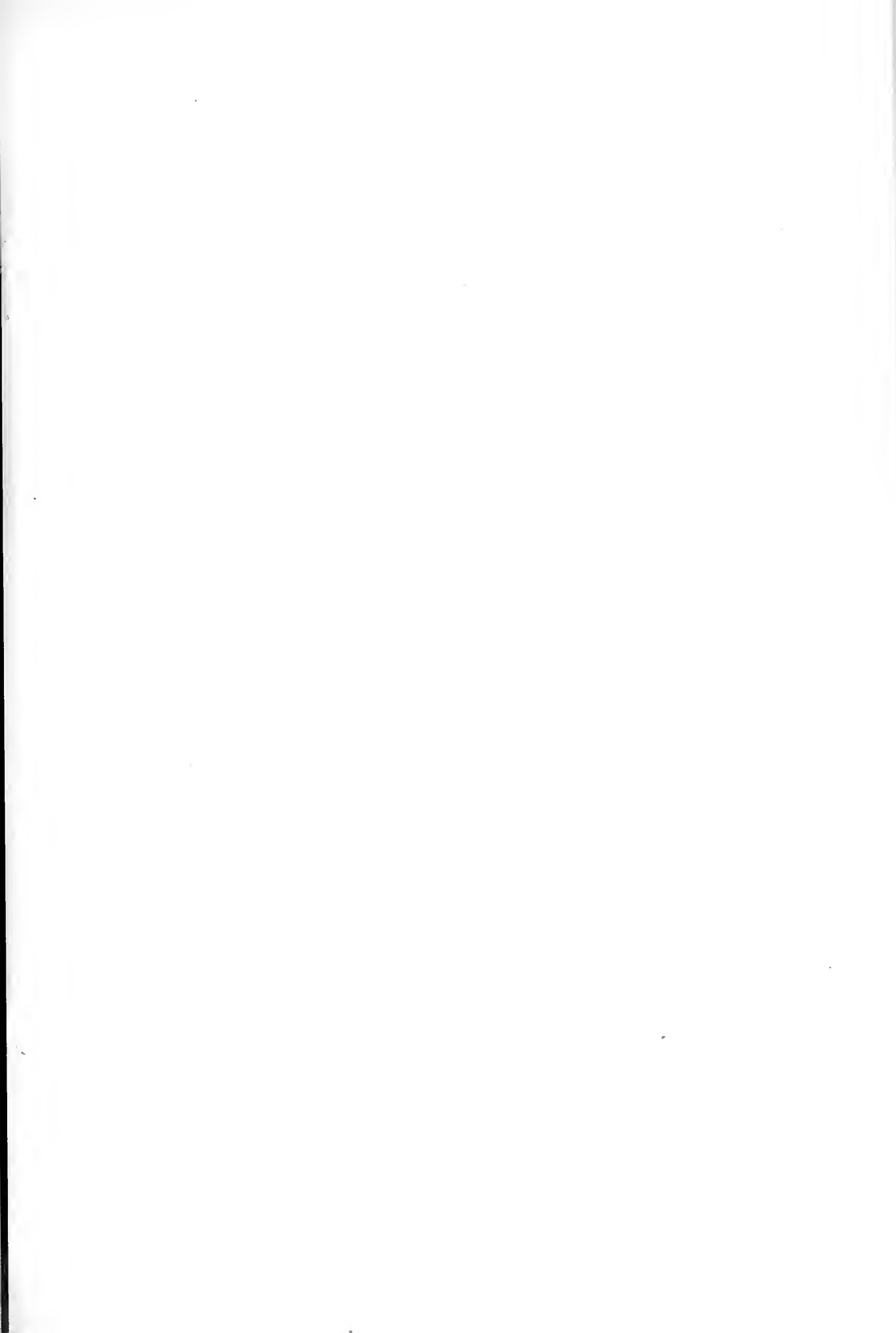
Fig. 6.

Fig. 5.



WITNESSES
H. W. Leach
J. H. Smith

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Julius Wellner
 BY
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 ATTORNEY.



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SOUND REPRODUCING MACHINE.
APPLICATION FILED MAR. 21, 1904.

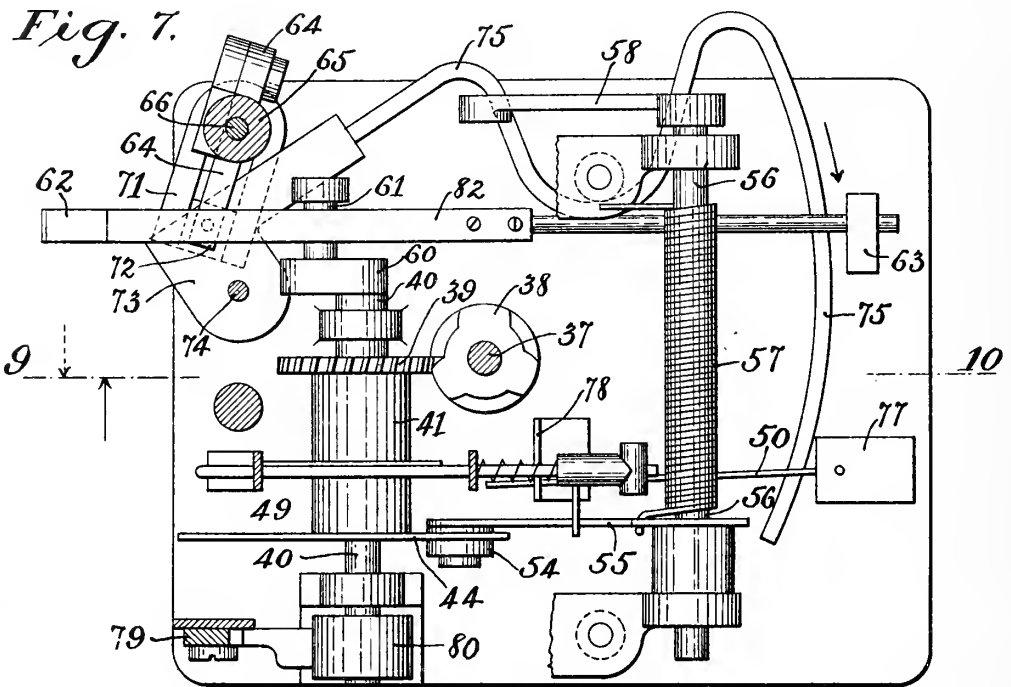
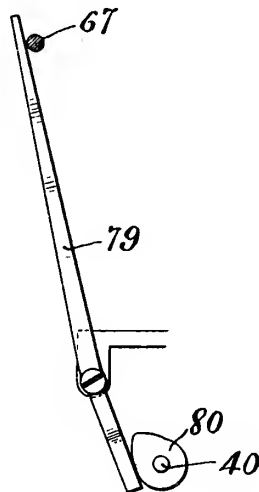


Fig. 8.



WITNESSES:

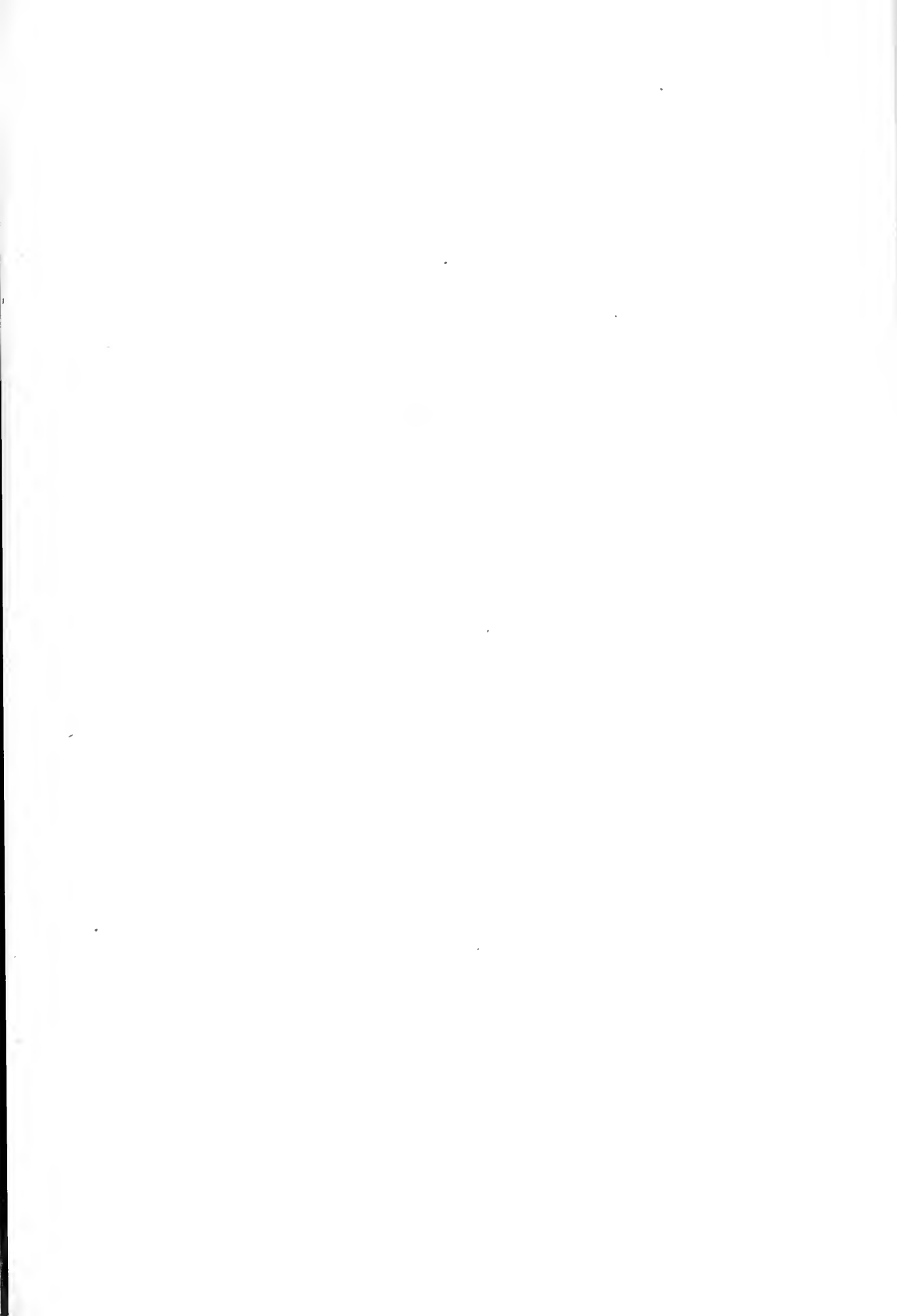
H. H. Leiby
H. Gamble

INVENTOR

Julius Wellner

BY

A. V. Trout
ATTORNEY.



J. WELLNER.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAR. 21, 1904.

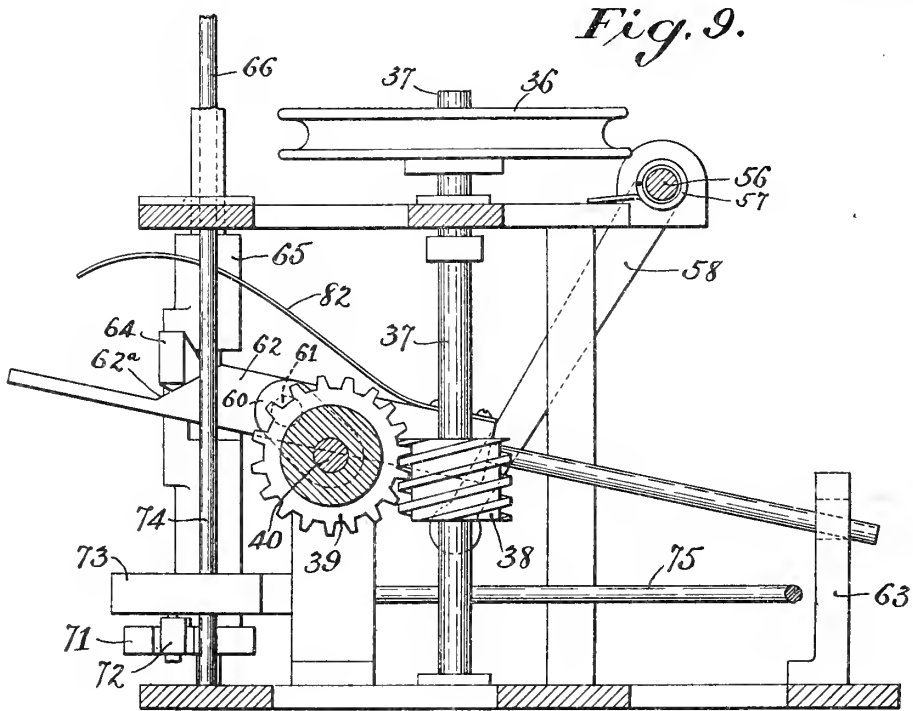


Fig. 9.

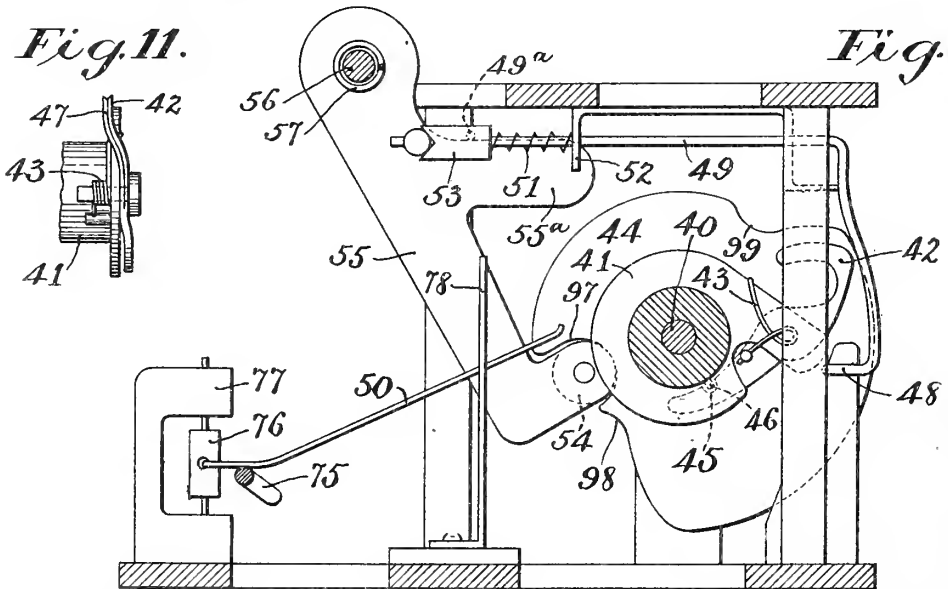


Fig. 11.

Fig. 10.

WITNESSES:
H. H. Leuby
J. J. Sample

INVENTOR
Julius Wellner
 BY
A. V. Grouse
 ATTORNEY.

UNITED STATES PATENT OFFICE.

JULIUS WELLNER, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 789,827, dated May 16, 1905.

Application filed March 21, 1904. Serial No. 199,092.

To all whom it may concern:

Be it known that I, JULIUS WELLNER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

This invention relates to that class of sound-reproducing machines wherein a stylus in connection with a diaphragm is adapted to coact with a record-groove for the reproduction of sound.

The object of the invention is to provide a simple and efficient construction and organization of mechanism whereby the stylus may be automatically removed from its support after the reproduction of a record and a new stylus automatically substituted for the old one.

With this object in view the invention consists in the novel construction and combinations of parts which will be hereinafter fully described and claimed.

In the drawings, Figure 1 is a plan view of a sound-reproducing machine embodying my invention. Fig. 2 is an elevation thereof. Fig. 3 is a sectional detail of the bar for starting the machine in motion and adjuncts as on the line 3 3 of Fig. 1. Fig. 4 is an elevation of the sound-box and adjuncts. Fig. 5 is a sectional detail thereof as on the line 5 5 of Fig. 4. Fig. 6 is a detail as on the line 6 6 of Fig. 5, showing the stylus clamped. Fig. 7 is a sectional plan as on the line 7 7 of Fig. 2. Fig. 8 is a detail, in elevation, of one of the levers for moving the sound-box. Figs. 9 and 10 are sectional elevations as on the line 9 10 of Fig. 9, Fig. 9 as seen from the dotted-line and Fig. 10 as seen from the full-line arrow. Fig. 11 is a detail of Fig. 10 as seen from the right-hand side of the latter.

1 designates the sound-box, 2 the stylus, 4 the rotatable turn-table, and 8 the record supported thereon and rotatable therewith. The record 8 is provided with the usual helical groove 11 or composition to be reproduced, and the sound-box is mounted on a telescopic tube 12, so as to be radially movable to permit the stylus to traverse the rec-

ord-groove and partially rotatable to permit the stylus to be moved into and out of engagement with said groove. The telescopic tube is supported on a post 13, rising from the bed-plate 14.

Suitably mounted on the sound-box 1 is an arm 15, one end of which is connected with the diaphragm 16 and the other end of which is enlarged and provided with an opening 17 for the reception of the stylus 2. Extending transversely through the enlarged end of the arm 15 and one side of the opening 17 is a pin 18, provided with a notch 19, one side of which is adapted to engage and retain the stylus within the opening 17, as seen in Fig. 6. The pin 18 extends outwardly beyond the arm 15 and is provided with an encircling spring 20, which, bearing against the arm 15 and a head 21 on the end of the pin 18, tends normally to maintain the side of the notch 19 in engagement with the stylus 2. The pin 18 is provided with a stop 22, which, taking against the arm 15, limits the movement of the pin 18 by the spring 20 when there is no stylus within the opening 19.

Secured to the sound-box 1 is one end of a spring 23, the other end of which extends to and bears against the inner end of the stylus 2 when the stylus is within the opening 17, to the end that when the pin 18 is moved against the action of the spring 20 to remove its pressure from the stylus 2 said stylus will be ejected by the action of the spring 23.

Pivoted to a bracket 24 on the sound-box 1 is a lever 25, having one of its ends arranged directly above the head 21 on the pin 18. The other end of the lever 25 is offset, as at 26, and is adapted to be engaged by the short end 27 of a lever 28, which is pivoted to the sound-box, as at 29^a. Secured to the bracket 24 and the lever 25 are the respective ends of a spring 29, which when the lever 25 is released from engagement with the arm 27 of the lever 28 is adapted to move the lever 25 into engagement with the head 21 and depress the pin 18 against the action of the spring 20, the force of the spring 29 being sufficient to overcome that of the spring 20. The long end 30 of the lever 28 extends to a position directly above the record 8 when the

stylus 2 is in engagement with the groove 11 whereby when the sound-box is turned to disengage the stylus 2 from the groove 11 the long arm 30 of the lever 28 will engage the record and be rocked to release its short end 27 from engagement with the lever 25 and permit the spring 29 to move the lever 25 to depress the pin 18, thereby freeing the stylus 2 and permitting its ejection from the opening 17 by the action of the spring 23.

The turn-table is mounted on a shaft 31, which is provided with a gear-wheel 32 in mesh with a gear-wheel 33 on the driving-shaft of a spring-motor 34, which tends normally to rotate the turn-table 4 and which may be of any approved type. The shaft 31 is provided with a pulley 35, which is belted with a pulley 36 on the upper end of a vertical shaft 37. This shaft 37 carries a worm 38 in engagement with a worm-wheel 39, which is mounted to rotate freely upon a horizontal shaft 40. The hub of the worm-wheel 39 carries a projection 41, to which is pivoted a latch-lever 42. The inner end of the lever 42 is by the action of a suitable spring 43 held normally against the hub of a cam 44, hereinafter referred to, which is fixed to the shaft 40. The inner end of the lever 42 is provided with a notch 45, which is adapted to engage a projection 46 on the hub of the cam 44, and thereby lock the shaft 40 to rotate with the worm-wheel 39. The outer end of the lever 42 is bent laterally, as shown in Fig. 11, and is provided in its edge with a cam-groove 47, which during the rotation of the shaft 40 is adapted to engage the lower end of an arm 48, depending from a horizontal rock-shaft 49 and also to engage the free end of an arm 50, hereinafter referred to, in a manner to move the notch 45 from engagement with the projection 46. The arm 48 is held normally in position by the tension of a spring 51, engaging the bearing 52 of the shaft 49, and a collar 53, secured to said shaft. Bearing against the cam 44 is a roller 54 on the free end of an arm 55, projecting from a rock-shaft 56. Encircling the shaft 56 is a spring 57, which engages the arm 55 and tends normally to maintain the roller 54 in engagement with the cam 44. Projecting from the shaft 56 is an arm 58, which is connected to a bar 59, adapted to be operated by hand to set the machine in motion, as will be hereinafter explained.

The shaft 40 is provided with a crank-arm 60, carrying a projecting pin 61, which extends through and supports one end of a bar 62, the other end of which extends freely through an opening in a lug 63, projecting from the frame, to the end that when the shaft 40 is rotated the bar 62 will be raised and lowered and at the same time longitudinally reciprocated. The bar 62 is arranged to engage the under side of the free end of an arm 64, the other end of which is pivoted to

a vertically-arranged shaft 65. Extending through the upper portion of the shaft 65 and slidingly fitted thereto is a rod 66. The lower end of this rod 66 rests upon the arm 64, and resting upon the top of the rod 66 is a horizontal arm 67, one end of which is pivoted to an extension 68 on the upper end of the shaft 65. Secured to the end of the arm 67 is a downwardly-extending member 69, provided with an opening through which freely extends a weighted arm 70, projecting from the sound-box 1.

The lower end of the vertical shaft 65 is provided with a bifurcated projecting arm 71, to which is fitted a block 72, pivoted to an arm 73, projecting from a vertical shaft 74, to the end that when the shaft 65 is rocked the arm 73 will also be rocked. The arm 73 carries a projection 75, provided with a curved end, which is arranged to be moved back and forth beneath the arm 50, hereinbefore referred to, when the arm 73 is moved. One end of the arm 50 is horizontally pivoted to a block 76, which in turn is vertically pivoted to a bracket 77 on the main frame. The arm 50 rests normally upon the curved end of the projection 75 and its other or free end extends through an opening in a plate 78, projecting from the main frame, the free end of the arm 50 being arranged to engage the cam-groove 47 in the lever-arm 41.

Pivoted to the main frame is a lever 79, the upper end of which occupies a position adjacent to the arm 67 and the lower end of which is arranged adjacent to a cam 80 on the shaft 40, whereby when the shaft 40 starts to rotate the cam 80 will engage the lower end of the lever 79 and cause its upper end to move the arm 67 and therewith the sound-box 1 to bring the stylus 2 to a position above the outer portion of the record 8.

81 designates a magazine adapted to contain a number of styluses arranged one above the other, as shown in Fig. 4. This magazine is supported by and projects upwardly from a bracket 83, which extends fixedly from the post 13. The bottom of the magazine 81 opens into a guideway 84, to which is fitted a reciprocative plunger 85. The guideway 84 and plunger 85 are arranged in line with the opening 17 when the sound-box is in the normal or inoperative position, whereby when the plunger is projected toward the sound-box it will engage the lowermost stylus in the magazine and project it into the opening 17 against the action of the spring 23, and when the plunger 85 is retracted the styluses in the magazine will fall by gravity and the lowermost stylus will pass into the guideway 84 in line with the plunger 85 for a succeeding operation. The plunger 85 is connected by a link 86 with one arm of a bell-crank lever 87, which is loosely mounted on a shaft 88, rising from the bed-plate, and secured at its respective ends to

the link 86 and bracket 83 is a spring 89, which tends normally to move the plunger 85 toward the sound-box. The other arm of the bell-crank lever 87 is connected to one end of a rod 90, the other end of which is provided with a pin 91, arranged within a slot 92 in the bar 59, to the end that when the bar 59 is moved outwardly by hand the end of the slot 92 will engage the pin 91 and operate the bell-crank lever 87 in a manner to retract the plunger 85, and when the bar is moved inwardly by the action of the machine the plunger will be projected toward the sound-box 1 to automatically insert a stylus within the opening 17.

Supported by the bracket 83 is one end of a rod 93, which is arranged adjacent to the lever 25. The other end of this rod 93 is connected by a link 94 to one arm of a bell-crank lever 95, which is loosely mounted on the shaft 88 and has its other end connected by a rod 96 to the bar 59, whereby when said bar is moved outwardly by hand the rod 93 will engage and move the lever 25 against the action of the spring 29 for a purpose hereinafter explained.

The cam 44 is provided with a deep notch 97 and two other notches 98 and 99, and after the record upon the turn-table has been reproduced the machine is automatically brought to rest by the roller 54 engaging the deep notch 97 and locking the parts against further movement by the motor 34. When the machine comes to rest, the parts occupy the positions shown in the drawings, wherein the roller 54 rests in the deep notch 97, the notch 45 of the lever 42 is in engagement with the projection 46, the lower end of the arm 48 is in position to engage the inner end of the cam-groove 47, and the sound-box occupies a position above and beyond the record 8, the weighted arm 70 being raised to bring the opening 17 in line with the plunger 85.

The operation of the machine may be briefly described as follows: When it is desired to start the machine in motion, the bar 59 is moved outwardly by hand. The first movement of the bar 59 projects the rod 93 to move the lever 25 against the action of the spring 29 and away from the head 21 on the pin 18, thereby permitting the spring 20 to move the pin 18 to engage and clamp the stylus 2 within the opening 17, and at the same time moving the offset 26 in the lever 25 into register with the short arm 27 of the lever 28, which by the weight of its long arm 30 is moved into engagement with said offset to maintain the lever 25 out of engagement with the head 21. By this time the end of the slot 92 reaches the pin 91, which through its connections retracts the plunger 85 to bring its forward end rearwardly beyond the styluses in the magazine 81, whereupon the lowermost stylus drops into the guide-way 84 in line with the plunger 85. During

the outward movement of the bar 59 the shaft 56 is being moved thereby against the action of the spring 57, and as the bar 59 reaches the limit of its outward movement the roller 54 is disengaged from the notch 97 to permit the motor 34 to start the operation of the machine. Immediately following the starting of the machine the outward pull or pressure of the bar 59 is removed and the spring 57 moves the roller 54 into engagement with the notch 98. Just as the roller 54 enters the notch 98 the cam-groove 47 in the lever 42 engages the arm 48, and thereby moves its notch 45 from engagement with the projection 46, whereupon the shaft 40 remains idle while the worm-wheel 39 is turned a complete revolution to permit the turn-table to acquire the desired speed before engaging the stylus 2 with the groove of the record. It will be observed that as the end of the arm 48 traverses the groove 47 it is cammed out of position to reengage the inner end of the groove 47 and that when the lever 42 again meets the arm 48 the side of the lever 42 engages the arm 48 and moves the latter still farther out of position. Therefore after the worm-wheel 39 has made a complete revolution the spring 43 causes the lever 42 to ride over and engage its notch 45 with the projection 46. This being done, the shaft 40 is turned by the worm-wheel 39 about a half-revolution, thereby causing the cam 80 to move the lever 79 to bring the stylus to a position over the outer portion of the record and causing the crank-arm 60 to lower the bar 62, whereupon the arm 64, the rod 66, and the arm 67 are lowered by gravity, and the weighted arm 70 turns the sound-box 1 to engage the stylus 2 with the record away from the groove thereof. It will be observed that the bar 62 is provided with a curved projection 82, which extends over the arm 64, and that the crank 60 not only lowers, but also retracts, the bar 62 during the half-turn of the shaft 40. This retraction of the bar 62 causes the projection 82 to engage the arm 64 by friction, and thereby turn the shaft 65 until the arm 67, carried thereby, moves the sound-box 1 inwardly to engage the stylus 2 with the outer turn of the groove of the record, whereupon the shaft 65 ceases to be turned by the projection 82, and the said projection passes idly over the said arm. After the shaft 40 has been turned a half-revolution, as above stated, the roller 54 engages the notch 99 to prevent further rotation of the shaft 40, and at the same time the groove 47 of the lever 42 engages the free end of the arm 50 and rocks said lever to disengage its notch 45 from the projection 46, and thereby disconnect the shaft 40 from the worm-wheel 39. We have now reached what we term "the playing position"—that is, the record-disk upon the turn-table 4 is being rotated and the stylus 2 is traversing

its groove to reproduce the composition in the well-known manner, and at the same time the stylus is moving toward the center of the record. As the stylus 2 moves toward the center of the record the arm 67 is moved therewith in a manner to slowly turn the shaft 65 and arm 71 to gradually move the arm 73 and the curved end of its projection 75 in the direction indicated by the arrow in Fig. 7. As the curved end of the projection moves in this direction it engages the arm 50 by friction and tends to maintain the latter in the position shown—that is, against the wall of the opening in the plate 78. During each successive revolution of the worm-wheel 39, while the composition is being reproduced, the free end of the arm 50 engages the lever 42 and prevents the notch 45 from engaging the projection 46, and each time the arm 50 engages the lever 42 it is cammed to one side by the groove 47 and out of line with the inner end of said groove; but before the lever 42 again meets the arm 50 the latter is moved by the friction of the curved end of the projection 75 to its normal position to engage the inner end of the groove 47. Thus the arm 50 is rocked back and forth during the playing of the record. After the stylus has reached the inner end of the groove of the record-disk it ceases to move inwardly, and consequently the projection 75 also ceases to move. Therefore when the arm 50 is cammed to one side by the groove 47 it is not returned to its normal position by the projection 75. Consequently the notch 45 of the lever 42 is permitted to engage the projection 46 and lock the shaft 40 to rotate with the worm-wheel 39 until the shaft 40 has been given another half-revolution and returned to its original position, as follows: The first movement of the shaft 40 causes the crank-arm 60 to raise the bar 62, which raises the arm 64, the rod 66, the arm 67, and the weighted arm 70, thereby turning the sound-box 1 to disengage the stylus 2 from the record 8 and at the same time moving the long arm 30 of the lever 28 into engagement with the record 8, thereby rocking the lever 28 to disengage its short arm 27 from the lever 25, which being free will be moved by the spring 29 to depress the pin 18 and unclamp the stylus 2, which will then be ejected by the spring 23. This being done, the crank-arm 60 moves the bar 62 longitudinally, thereby causing a shoulder 62^a on the bar 62 to engage the arm 64 and turn the shaft 65 in a manner to cause the arm 67, carried by the shaft 65, to move the sound-box 1 outwardly to its original position, whereupon the roller 54 engages the deep notch 97 of the cam 44 and locks the shaft 40, and perforce the entire machine, against further movement. The arm 55 is provided with a projection 55^a, which when the roller 54 enters the notch 97 is adapted to engage a pin projecting from the shaft 49^a,

and thereby move the arm 48 to its original position for reengagement by the lever 42. When the roller 54 enters the notch 97 by the action of the spring 57, the shaft 56 is rocked and the arm 58 moves the bar 59 inwardly to its original position, thereby permitting the spring 89 to move the plunger 85 toward the sound-box 1, and thus automatically insert the opposing stylus into the opening 17. Thus it will be seen that the parts come to rest in their original positions for a succeeding operation by the automatic action of the machine itself.

I claim—

1. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support, of means for automatically inserting a stylus in the stylus-support,

2. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box, the stylus and its support, of means for automatically moving the stylus from its support and means for automatically inserting a new stylus in the stylus-support.

3. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box, the stylus and the stylus-support carried by the sound-box, of means for automatically moving the stylus from said support, and means under the control of the movement of the stylus by the record-groove for automatically stopping the machine.

4. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box the stylus and its support, of means for automatically moving the stylus from its support, means for automatically inserting a new stylus in the stylus-support, and means under the control of the movement of the stylus by the record-groove for automatically stopping the machine.

5. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box, the stylus and its support, of means under the control of the movement of the stylus by the record-groove for automatically moving the stylus from its support.

6. In a sound-reproducing machine, the combination with the rotatable record-support, the sound-box and the stylus-support, of a source of power to operate the machine, means adapted to be operated to start the machine in motion, means for automatically inserting a stylus in the stylus-support, and means for automatically stopping the machine.

7. In a sound-reproducing machine, the combination with the rotatable record-support, the sound-box, the stylus and its sup-

port, of a source of power to operate the machine, means adapted to be operated to start the machine in motion, means for automatically moving the stylus from its support, and means for automatically stopping the machine.

8. In a sound-reproducing machine, the combination with the rotatable record-support, the sound-box, the stylus and its support, of a source of power to operate the machine, means adapted to be operated to start the machine in motion, means for automatically moving the stylus from its support, means for automatically inserting a new stylus in the stylus-support and means for automatically stopping the machine.

9. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support, of means for automatically inserting a stylus in the stylus-support and means for clamping the inserted stylus.

10. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support, of a magazine adapted to contain a plurality of styluses and means for automatically moving a stylus from the magazine and into the stylus-support.

11. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support, of a magazine adapted to contain a plurality of styluses, a reciprocative plunger adapted to engage one of the styluses in the magazine and move it into the stylus-support and means for automatically operating the plunger.

12. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support movable into and out of operative position, of a fixed magazine adapted to support a plurality of styluses adjacent to the path traversed by the stylus-support and means adapted to be operated to move a stylus from the magazine and into the stylus-support.

13. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support movable into and out of operative position, of a fixed magazine adapted to support a plurality of styluses adjacent to the path traversed by the stylus-support, and means for automatically moving a stylus from the magazine and into the stylus-support.

14. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the sound-box and the stylus-support movable into and out

of operative position, of a fixed magazine adapted to support a plurality of styluses adjacent to the path traversed by the stylus-support, a reciprocative plunger adapted to engage and move a stylus from the magazine and into the stylus-support and means for automatically operating said plunger.

15. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the partially-rotatable sound-box the stylus and its support, the sound-box being adapted to be moved on its axis of rotation to move the stylus into and out of engagement with the record, of means for automatically moving the stylus from its support when the sound-box is turned to disengage the stylus from the record.

16. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the partially-rotatable sound-box the stylus and its support, the sound-box being adapted to be moved on its axis of rotation to move the stylus into and out of engagement with the record, of a clamping device to secure the stylus to its support and means for automatically operating said device to release the stylus when the sound-box is turned to disengage the stylus from the record.

17. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the partially-rotatable sound-box, the stylus and its support, the sound-box being adapted to be moved on its axis of rotation to move the stylus into and out of engagement with the record, of a clamping device to secure the stylus to its support, means for automatically operating said device to release the stylus when the sound-box is turned to disengage the stylus from the record and means for ejecting the stylus from its support when released by the clutch device.

18. In a sound-reproducing machine, the combination with the rotatable record-support, rotating means therefor, the partially-rotatable sound-box, the stylus and its support, the sound-box being adapted to be moved on its axis of rotation to move the stylus into and out of engagement with the record, of a clamping device to secure the stylus to its support, a rocking lever adapted to operate said device to release the stylus and means for automatically rocking said lever when the sound-box is turned to disengage the stylus from the record.

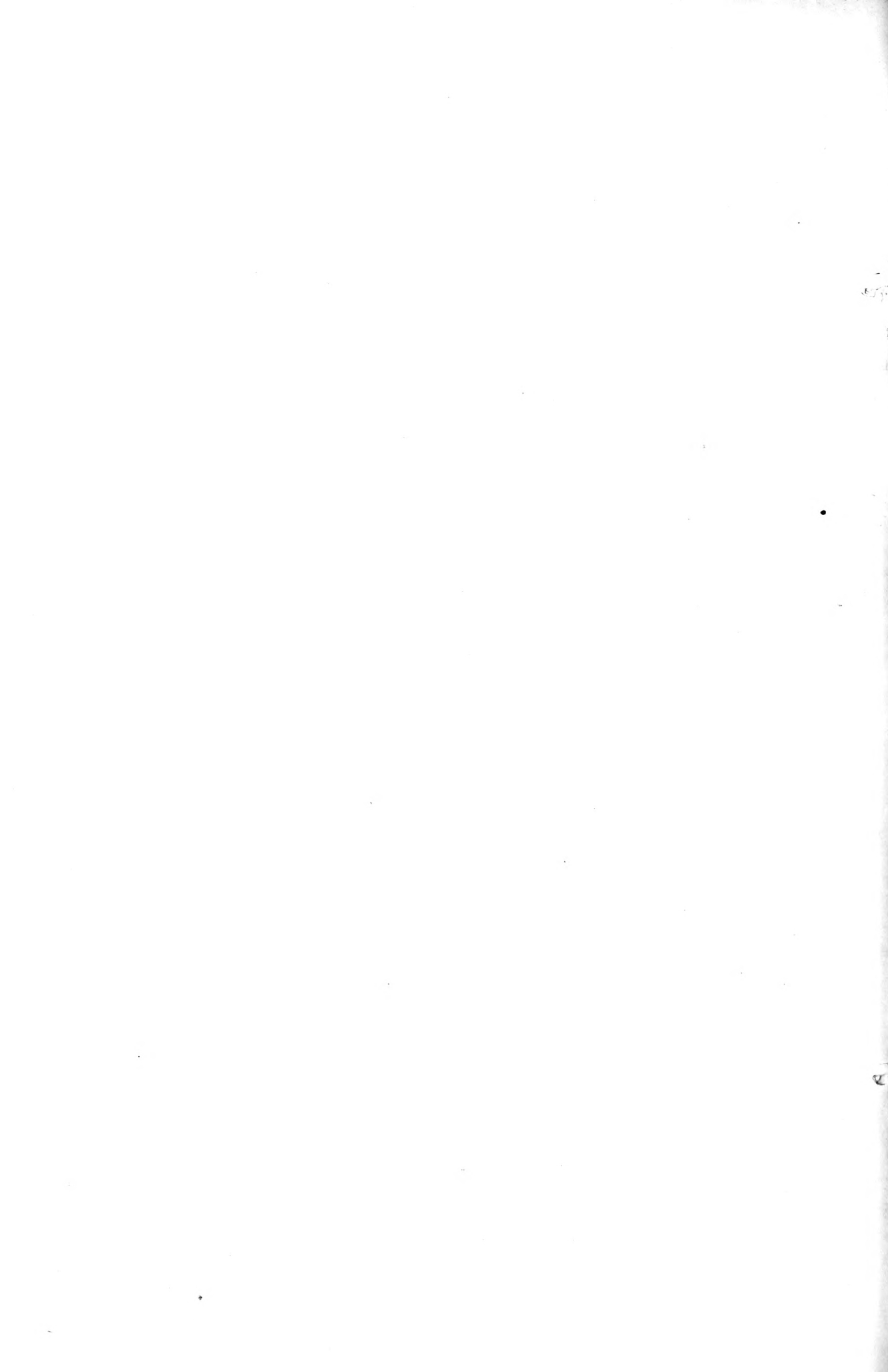
In testimony whereof I affix my signature in presence of two witnesses.

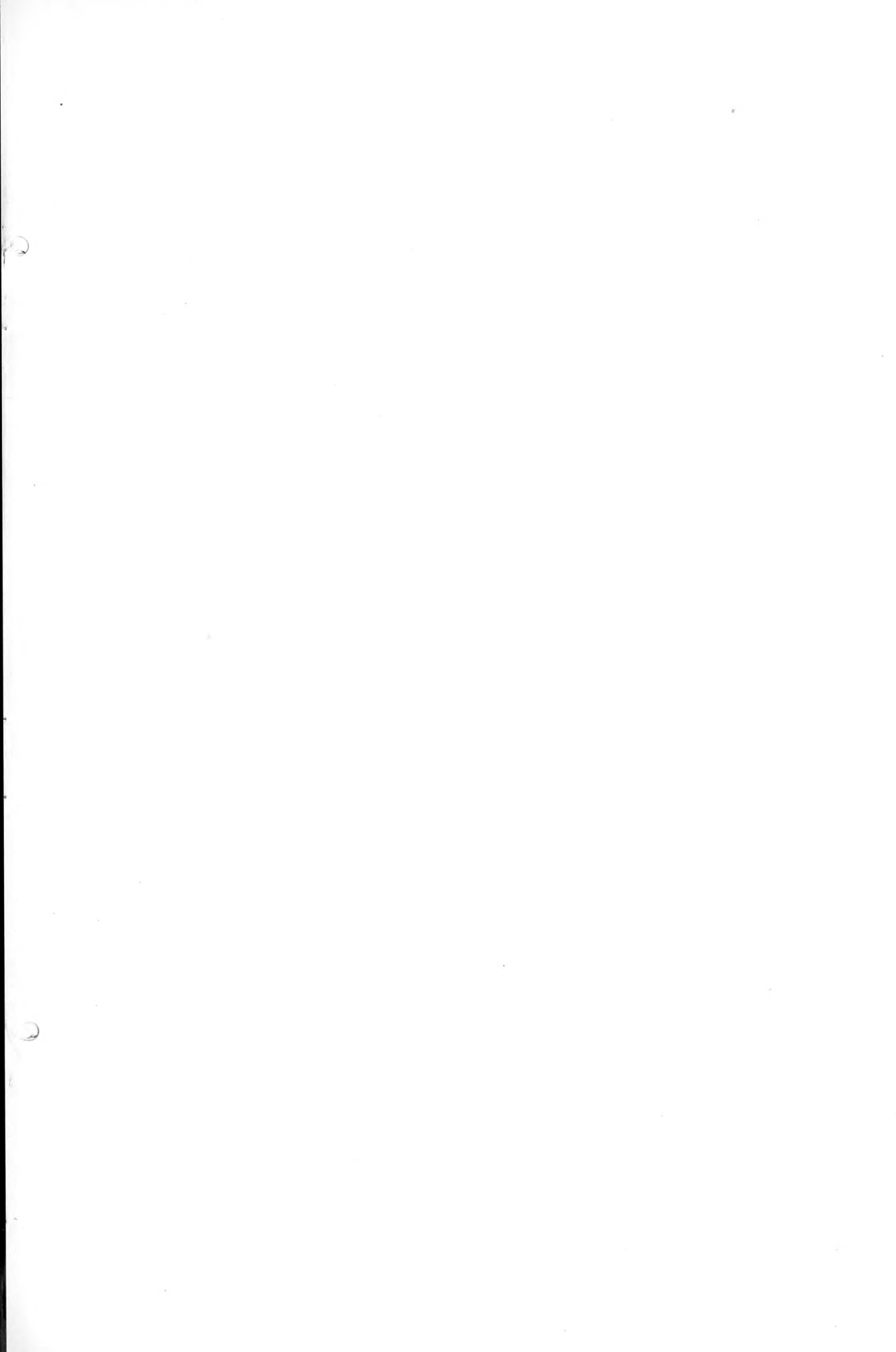
JULIUS WELLNER.

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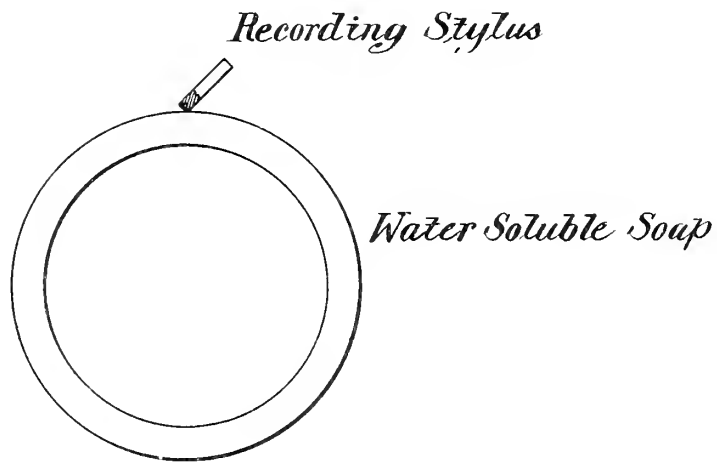
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T. A. EDISON.

PROCESS OF DUPLICATING PHONOGRAPHIC RECORDS.

APPLICATION FILED FEB. 11, 1903.



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PROCESS OF DUPLICATING PHONOGRAPHIC RECORDS.

SPECIFICATION forming part of Letters Patent No. 790,351, dated May 23, 1905.

Application filed February 11, 1903. Serial No. 142,928.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Processes of Duplicating Phonograph-Records, of which the following is a specification.

My present invention relates to an improved process for duplicating phonograph-records from a matrix or mold, and particularly to the production of an improved master from which the matrices or molds are made.

The object of the invention is to produce an original master carrying a cut record corresponding accurately to sound-waves and free from extraneous surface variations or disturbances, so that no sound will be reproduced other than that representative of the true record. When a matrix or mold is made so as to faithfully copy such a master, as I shall describe, the resulting duplicates obtained from the matrix or mold by any well-known process are superior to records as now made, whether original or duplicate, in a number of respects to be presently pointed out.

I find that in order to produce an absolutely perfect master from which a corresponding matrix or mold can be subsequently made it is necessary to employ a material or substance which is perfectly amorphous and without crystallization, that is uniform in structure at least for a sufficient depth within its surface to receive the record, that has sufficient adhesion to permit a substantially continuous shaving to be cut by the recording device, and that, finally, is of such a character as to be readily cut by the recorder in order that the latter may form a perfectly smooth record, which while representative of the true vibrations shall not possess superfluous surface variations that at the present time and with present materials produce scratching and other extraneous sounds. When a material of this character is employed from which to construct the master, I find that owing to its relatively soft character much less power is required to cut it, so that all of the sound-vi-

brations will be recorded, even those representing the very weak overtones of musical instruments, also that the depth of the record can be considerably increased, so as to thereby permit very loud sounds to be recorded without danger of the recorder vibrating clear of the surface, and finally that a perfectly smooth record will be cut, even when very deep, with a substantially continuous chip, so as to entirely eliminate the scratchy sounds now due to the mere cutting of the present material.

Preferably the invention consists in the employment for the manufacture of the master of a neutral or nearly neutral soap soluble in alcohol and in hot water and by preference a soda-soap and in the manipulation of this material to put it into the required form for use in receiving a sound-record.

Reference is hereby made to the accompanying drawing, which illustrates diagrammatically the formation of a master-record according to one form of my invention.

In carrying the invention into effect I prefer to proceed as follows: Any of the finer qualities of the soaps of commerce are cut in thin slices, and, if necessary, are dried. Some of these soaps, like Pears's soap, for example, contain so little water that a special drying is not necessary. The dry sliced material is now dissolved in ethyl alcohol maintained in a heated state by hot water—in a water-jacket, for instance—until the alcohol is nearly saturated. A small quantity of water is added to clear the solution, which is then filtered through a fine cloth in a funnel heated by a surrounding water-jacket. The filtered solution is now heated in any suitable way until enough alcohol is evaporated to result in the production of a viscous mass capable of being cast into a blank by any of the well-known casting processes now used for manufacturing phonograph-blanks. These blanks may be either disk-like or cylindrical or of other form, according to the particular kind of records which are to be made. The blank after it has become cool is hard and firm enough to maintain its shape under normal conditions, its hardness depend-

ing upon the amount of water and alcohol remaining in the material. Blanks made in this way are now turned roughly to their approximate desired size and are allowed to season in a warm room for several days, during which they become gradually harder, due to further loss of alcohol and water. The blanks are then ready for use after they have been turned to the proper size for receiving the record.

10 Phonograph-blanks made in this way are transparent, perfectly amorphous, non-crystalline, and uniform in structure throughout, and they are capable of receiving a record of sound-vibrations whose track is perfectly polished. In these respects blanks or records made as I now suggest are distinguished from blanks or records made of the recording material now universally used, since the latter is not soluble in water, is very hard and semi-crystalline, and results in the formation of a record which on reproduction produces scratchy and extraneous sounds in addition to those constituting the record itself.

Phonograph-blanks produced as I suggest are now used for receiving a sound-record made in any suitable sound-recording machine, either of the phonograph type, in which a record of varying depth is formed, or of the gramophone type, in which a sinuous record of substantially uniform depth is formed. In the making of original records at the present time, whether for use as masters or not, the ordinary wax-like material is quite friable, so that the material is removed by the recorder in the form of short chips. The removal of the material in this way makes the record-groove quite rough, and this roughness of the record-groove is materially increased if the recorder cuts too deeply into the material. Consequently at the present time very loud records are more scratchy than softer ones. With my improved recording material as used by me, owing to its relative softness, the recorder cuts out a practically continuous shaving and makes a perfectly smooth track, and this is true even if the cut of the record is quite deep. Consequently by the use of the new material I am enabled to employ recorders having a diameter as low .015 of an inch, whereby I am enabled, with no increase in the power used, to cut a record at least twice as deep as is now possible with the recorders of standard size—namely, about .040 of an inch in diameter.

The new material I find is too soft to permit of direct reproduction by a reproducing device, since the small waves will be immediately obliterated by the reproducer. I therefore use a record obtained as described as a master from which to construct a matrix or mold. To this end, therefore, I first provide the master with a conducting-coating, preferably by a process of vacuous deposit, as described in my Patent No. 713,863, dated November 18, 1902. The coating thus formed

is extremely thin and is so uniform that it follows all the variations of the record, however minute. Besides this a conducting-coating, if applied in this way, is so smooth and polished that when incorporated in the record-surface of the matrix or mold it will not of itself produce any extraneous sound. Having coated the master with a conducting-film, I now electroplate copper thereon until a layer of the desired thickness is secured, after which the original master is removed either by shrinking or dissolving it out. The matrix or mold is now preferably backed up by a protecting-shell and is used for the production of duplicates in any well-known way, formed of the usual hard, wax-like materials. For instance, the matrix or mold can be employed for making duplicates by an expanding process, as specifically described in my Patent No. 713,209, dated November 11, 1902, in which a blank is engaged loosely with a matrix and expanded by heat and pressure to take an impression therefrom, after which the duplicates are contracted radially so as to clear the record on the matrix, from which they are then removed, or in connection with a casting process, as described in my Patent No. 667,662, dated February 5, 1901, in which molten wax-like material is introduced into a mold and allowed to set therein, after which the resulting duplicate is contracted, so as to clear the record on the mold, from which it is then removed, or in connection with any other desired process by which a duplicate record can be obtained from a matrix or mold. In any event the duplicates so produced will be superior to those made at the present time from matrices or molds secured from masters composed of the usual hard wax-like material in the following respects: First, owing to the amorphous, non-crystalline, and uniform character of the master the record formed therein will be free from extraneous sounds, and this will also be true of the resulting duplicates; second, owing to the fact that the master is formed of comparatively soft material the record made therein is more nearly representative of the sound-vibrations than is possible with harder materials, so that the resulting duplicates will more faithfully reproduce the original sounds, including even the finer overtones of musical instruments; third, owing to the ease with which the material can be cut the record formed in the master can be made very deep, so that the reproductions obtained from the resulting duplicates will be correspondingly increased in volume.

While I have described as the preferred material one formed by the dissolving of a soluble soap, by then clarifying the solution, and by finally evaporating the solvent, it will be understood that other soluble, amorphous, non-crystalline, and uniform substances may be employed either alone or in addition to

soap, by which harder or softer blanks can be obtained.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. The process of making a phonograph-record which consists in obtaining a mass of exceedingly soft material, hardening the same until it is hard enough to receive a polished surface from a cutting tool or stylus, but is not hard enough to be capable of reproduction, and recording sound-waves therein while in the latter condition, substantially as set forth.

2. The process of duplicating sound-records which consists in obtaining a mass of exceedingly soft material, hardening the same until it is hard enough to receive a polished surface from a cutting tool or stylus, but is not hard enough to be capable of reproduction, recording sound-waves thereon while in the latter condition to form a master, making a matrix or mold from said master and finally in impressing the negative record carried by the matrix or mold in the surface of the desired duplicates, substantially as set forth.

3. The process of making a phonograph-blank, which consists in dissolving a water-soluble soap in hot alcohol to saturation, in

then molding the blanks therefrom, and in finally partially evaporating the solvent, substantially as set forth.

4. The process of making a phonograph-blank, which consists in dissolving a water-soluble soap in hot alcohol to saturation, in filtering the clear solution, in partially evaporating the solvent to form a viscous mass, in molding the mass into shape, and in finally partially evaporating the remaining solvent, substantially as set forth.

5. The process of duplicating sound-records which consists in dissolving a water-soluble soap in hot alcohol to saturation, molding a phonograph-blank therefrom, partially evaporating the solvent from said blank, cutting a record-groove therein to form a master, making a matrix or mold from said master and finally impressing a negative record carried by said matrix or mold in the surface of the desired duplicate, substantially as set forth.

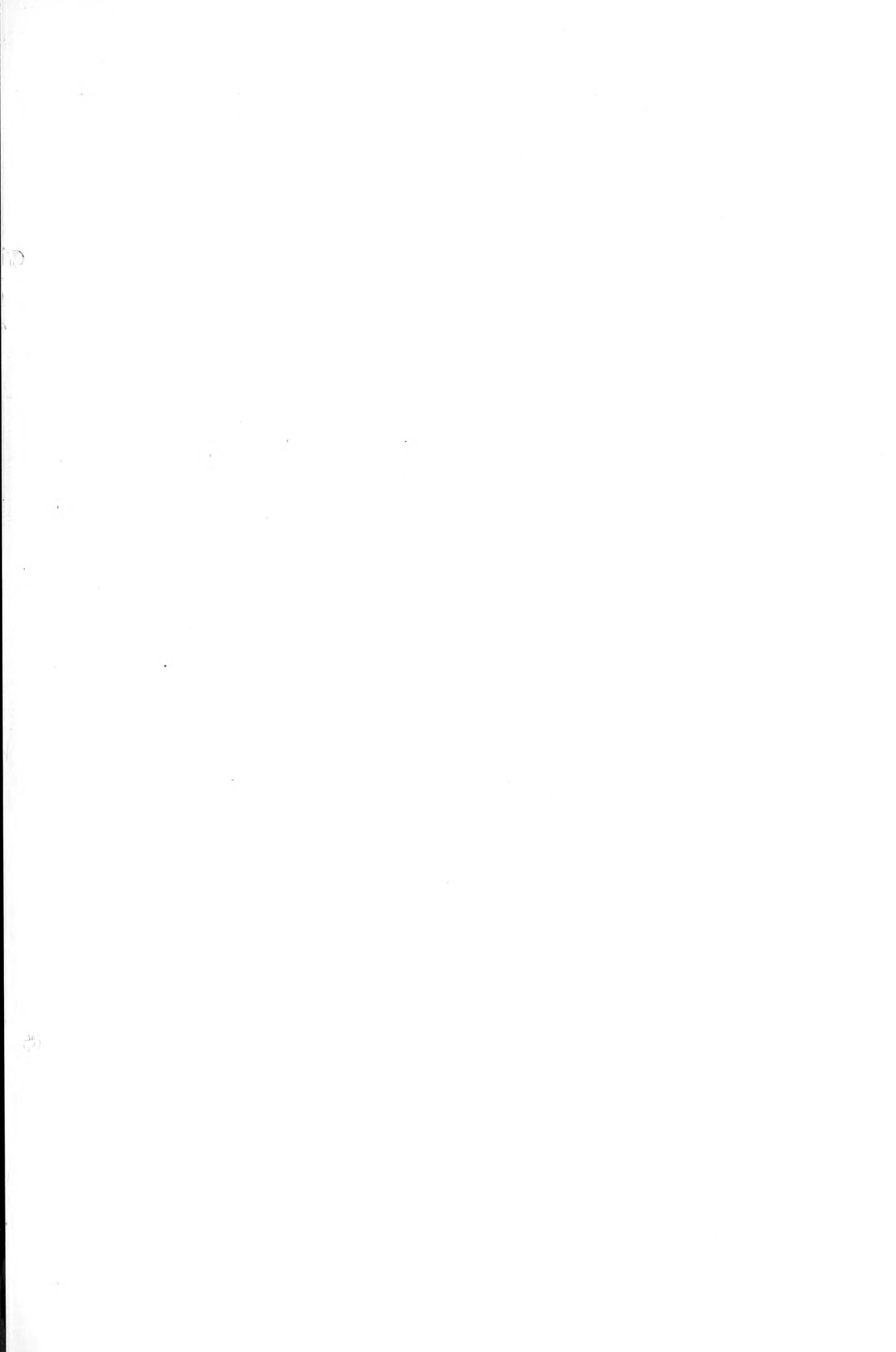
This specification signed and witnessed this 30th day of January, 1903.

THOMAS A. EDISON.

Witnesses:

J. F. RANDOLPH,
FRANK L. DYER.



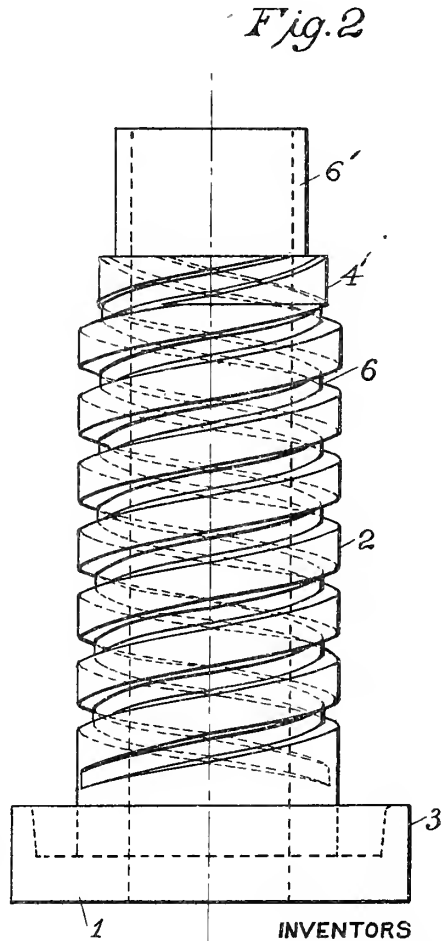
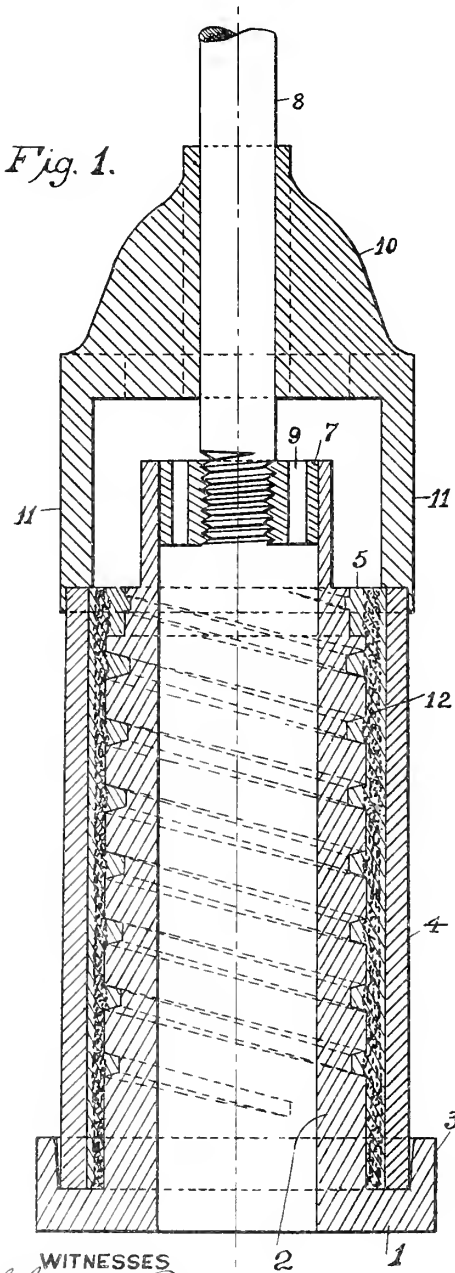


No. 790,516.

PATENTED MAY 23, 1905.

W. H. MILLER & A. N. PIERMAN.
APPARATUS FOR MAKING SOUND RECORDS OR BLANKS.

APPLICATION FILED DEC. 26, 1903.



WITNESSES
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INVENTORS
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by *Frank L. Soper*
Attorney

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR MAKING SOUND RECORDS OR BLANKS.

SPECIFICATION forming part of Letters Patent No. 790,516, dated May 23, 1905.

Application filed December 26, 1903. Serial No. 186,649.

To all whom it may concern:

Be it known that we, WALTER H. MILLER, residing at Orange, and ALEXANDER N. PIERMAN, residing at Newark, in the county of Essex and State of New Jersey, citizens of the United States, have invented a certain new and useful Apparatus for Making Sound Records or Blanks, of which the following is a description.

Our invention relates to improved apparatus for making sound records or blanks, and particularly of the type set forth in our Patents Nos. 726,966 and 726,967, dated May 5, 1903, in which a mass of fibrous material is distributed through the wax-like substance so as to make the resulting article of greatly increased durability. In making records of this type we first applied a layer of cotton-battling to a tapered core, which was then introduced into a mold, and a molten wax-like material was then allowed to enter the space between the core and the mold to impregnate the fibrous material.

In carrying the process in question into practice it was found that since the sheet of fibrous material was of substantially the same thickness throughout its application to a tapered core resulted in a variation in the density of the fibrous mass, such density gradually increasing from the upper and smaller end of the core toward the lower and larger end thereof. This variation in the density of the fibrous mass resulted in very considerable variations in the distribution of the wax-like material going into the make-up of the resulting articles. Thus where the record or blank was thinnest there would be a relatively great mass of fibrous material and a relatively small amount of the wax-like material and at the thickest end a relatively small amount of the fibrous material and a disproportionately large bulk of the wax-like substance. These variations in the structure of the composite article resulted in unequal expansion and contraction through the mass and made the proportion of discards due to cracking objectionably large.

The object of our present invention is to

overcome this objection and to permit of the manufacture of sound records and blanks which shall be substantially uniform both in bulk and in structure throughout their entire mass. This will be so whether the improved apparatus is used in the manufacture of composite records of the type described in our patents above referred to or whether the sound records or blanks are of the usual type. Furthermore, the improved apparatus permits of the manufacture of sound records or blanks wherein a minimum amount of material is used, whereby the cost of production will be correspondingly reduced.

To this end the invention consists in the features hereinafter described and claimed.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional view of the improved apparatus in its preferred form, and Fig. 2 a front elevation of the core.

In both of the views corresponding parts are represented by the same numerals of reference.

The base 1 is formed with the integral core 2 and is also provided with a rim 3, having a tapered inner face for receiving a mold 4. This mold is made in any suitable way, and when duplicate sound-records are to be produced it is formed on its inner surface with the negative representation of the sound-record by any usual and well-known process. When the apparatus is to be used for the manufacture of blanks, a perfectly plain mold is used. The core 2 for its main exterior portion is of substantially the same diameter throughout; but preferably it is very slightly tapering toward its upper end, this taper being about five one-thousandths of an inch. Above the main approximately cylindrical portion the core is provided with a reduced cylindrical portion 4', so as to form a collar 5 on the upper portion of the resulting molded article, as will be obvious. The core 2 is formed on its exterior face with one or more spiral grooves 6 of gradually-increasing depth

from the lower end upward. Preferably two of these spiral grooves are employed to facilitate and expedite the removal of the core from the molded article. The spiral groove or grooves may actually extend into the reduced cylindrical portion 4', as shown, to form one or more very shallow ribs on the inner face of the collar 5; but in the subsequent reaming of the article these shallow portions will be trimmed off so that the finished article on its inner surface will present a flat collar 5, from which the rib or ribs extend spirally downward. Above the reduced portion 4 the core is formed with a cylindrical portion 6' of less diameter, which acts as a shield to prevent the cooling-water from flowing over the top of the core. The core is preferably hollow, as shown, and secured within its upper portion is a plug 7, into which is threaded a rod 8, by which the apparatus may be manipulated. The plug 7 is formed with openings 9 therein to permit the wax-like material or cooling-water to freely enter the hollow core. Mounted on the rod 8 is a disk 10, having a depending flange 11, which fits around the mold 4 so as to center the same with respect to the core, as will be understood.

In operation the parts are assembled as shown in Fig. 1, a layer of fibrous material 12 being preferably first wound loosely around the core before the introduction of the mold over the same, and the apparatus is then introduced into a suitable molten mass of wax-like material. Preferably the mold is first elevated to permit the wax-like material to be thoroughly impregnated with the wax, as we describe in Patent No. 771,880, granted October 11, 1904. The mold is then returned to its normal position, Fig. 1, thereby trapping the molten wax-like material between the core and the mold. This wax-like material also surrounds the mold and enters the core, so that the core and mold quickly reach the temperature of the wax-like material. Instead of following this procedure the mold may be slightly lifted from the base 1 to permit the molten wax-like material to enter the space between the core and mold from the bottom, rising slowly, so as to impregnate the fibrous material and driving all air before it, as we describe in our Patent No. 726,967, before referred to.

After the wax-like material has entered the space between the core and mold, so as to thoroughly impregnate the fibrous material, the apparatus is removed from the heating-tank, and the core and mold are then preferably simultaneously chilled by jets of cold water, so as to coagulate and solidify the mass. The disk 10 is then removed, the rod 8 is unscrewed from the plug 7, and the core 2 is

unscrewed from the cast article. The mold 12 is then allowed to further cool either artificially or by means of a water-jacket until the cast article shrinks diametrically to an extent to clear the surfaces, whereupon it is removed and reamed on its interior and finished on its ends, being then complete.

We do not claim herein the improved article of manufacture resulting from the operation of our apparatus, but will make the same the subject of a separate concurrent application.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A core around which a sound record or blank is cast of substantially the same diameter throughout and having a spiral groove therein of gradually-varying depth, substantially as set forth.

2. A core around which a sound record or blank is cast of substantially the same diameter throughout with a plurality of spiral grooves therein of gradually-varying depth, substantially as set forth.

3. A core around which a sound record or blank is cast of a very slight taper throughout its main portion and formed with a spiral groove therein of gradually-varying depth, substantially as set forth.

4. A core around which a sound record or blank is cast having a very slight taper and provided with a plurality of spiral grooves of varying depth throughout, substantially as set forth.

5. Apparatus for casting sound records or blanks comprising a mold and a core within the mold of substantially the same diameter throughout and provided with a spiral groove of varying depth throughout, substantially as set forth.

6. Apparatus for molding sound records or blanks comprising in combination a mold and a core therein of substantially the same diameter throughout and provided with a plurality of spiral grooves of varying depth throughout, substantially as set forth.

7. Apparatus for casting duplicate records or blanks comprising in combination a core, a base secured thereto, a rim carried by the base said rim having an inclined inner face and a mold loosely seated on said base within the rim and capable of being freely inserted or withdrawn therefrom, substantially as set forth.

This specification signed and witnessed this 24th day of December, 1903.

WALTER H. MILLER.

ALEXANDER N. PIERMAN.

Witnesses:

FRANK L. DYER,

DELOS HOLDEN.



No. 790,517.

PATENTED MAY 23, 1905.

W. H. MILLER & A. N. PIERMAN.
SOUND RECORD OR BLANK.
APPLICATION FILED DEC. 26, 1903.

Fig. 1

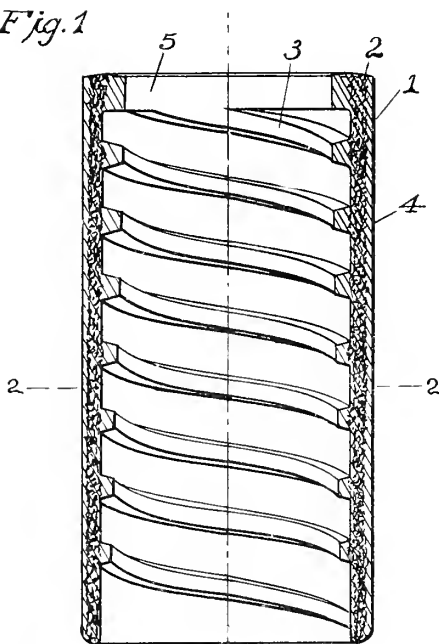


Fig. 3

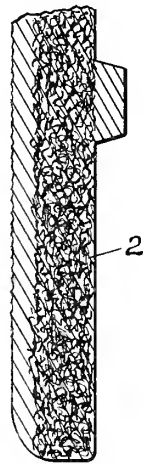
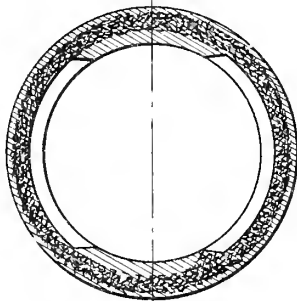


Fig. 2



WITNESSES

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INVENTORS

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UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND RECORD OR BLANK.

SPECIFICATION forming part of Letters Patent No. 790,517, dated May 23, 1905.

Application filed December 26, 1903. Serial No. 186,650.

To all whom it may concern:

Be it known that we, WALTER H. MILLER, residing at Orange, and ALEXANDER N. PIERMAN, residing at Newark, in the county of Essex and State of New Jersey, citizens of the United States, have invented a certain new and useful Sound Record or Blank, of which the following is a description.

Our invention relates to improvements in sound records or blanks, and particularly of the type described in our Patent No. 726,966, dated May 5, 1903, in which the usual wax-like article is intimately associated with a very considerable mass of a fibrous material, so as to result in the production of a record of greatly-increased durability.

Heretofore some sound records or blanks adapted for use on talking-machines of the phonograph type have been formed on their interiors with one or more ribs of substantially the same depth throughout, and since such articles are used on a tapered mandrel these ribs or projections are of increasing diameter. Consequently the thickness of the main portion of such records or blanks has varied from one end to the other. Owing to this variation in bulk of material, variations in temperature result in variations in expansion and contraction, and consequently the proportion of discards due to cracking has been objectionably large. Furthermore, in the manufacture of such duplicate sound-records the thinner portion of the record first contracts away from the mold, while the thicker portion thereof is still in contact with the mold, and consequently opportunity is offered for longitudinal contraction of the record to result in some distortion of the record-groove, producing "echoes." The objections noted are even more prominent in the manufacture of durable records of the type described in our patent above referred to, for the reason that in winding sheets of fibrous material around a tapered core the density of the fibrous material will be much greater at the larger end of the core than at the smaller end, and this permits a disproportionately small amount of wax to enter the make-up of the record at its thin

end compared to its thick end. Consequently the liability of cracking due to unequal expansion or contraction is increased.

The object of our invention is to provide a sound record or blank in which these objections are overcome; and to this end the invention consists of the features hereinafter set forth and claimed.

In order that our invention may be better understood, attention is directed to the accompanying drawings, in which—

Figure 1 is a sectional view of a composite or durable record or blank embodying our present improvements; Fig. 2, a cross-sectional view on the line 2 2 of Fig. 1, and Fig. 3 an enlarged vertical sectional view of a duplicate sound-record embodying the invention.

In all the views corresponding parts are represented by the same numerals of reference.

The record or blank 1 is cylindrical, or essentially so, on its exterior, and is preferably, although not necessarily, provided in its body with a loose mass 2 of fibrous material, preferably ordinary cotton-wool. On this interior the record is provided with one or more ribs or projections of gradually-reduced thickness throughout. When the projection is in the form of a spiral rib, we preferably make use of a plurality of such ribs, so as to facilitate the manufacture, permitting the more easy removal of the core from the cast article. In Fig. 1 we show the record or blank as being formed with two of such spiral ribs of gradually-reduced depth throughout. The exterior face 4 of the record or blank is composed of wax-like material, being free from fibrous substance which might interfere with the reproduction. The interior projections 3 are also composed wholly of the wax-like material due to the special procedure followed in manufacture. At the upper end of the record a collar 5 is formed, from which the spiral ribs extend, as shown. We make use of this collar, so as to give a good firm bearing to thereby prevent the possibility of the interior of the record being injured in forcing it tightly on the mandrel of the phonograph.

It will be understood that when the fibrous

material is omitted the record or blank will be composed of wax-like material throughout; but in every case the main portion of the record or blank will be of practically the same thickness at all points, the requisite tapering of the bore being secured by reducing the depth of the ribs or projections, as explained.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A sound record or blank having a main portion of substantially the same thickness throughout and an interior spiral rib of gradually-reduced depth, substantially as set forth.

2. A sound record or blank having a main portion of substantially the same thickness throughout, and a plurality of interior spiral ribs of gradually-reduced depth throughout, substantially as set forth.

3. A sound record or blank having a main portion of substantially the same thickness throughout, an interior collar at one end of said record or blank and a spiral rib extending interiorly of the record or blank from said collar and of gradually-reduced depth throughout, substantially as set forth.

4. A sound record or blank of substantially the same thickness throughout, having an interior collar at one end and a plurality of interior spiral ribs extending from said collar

and of gradually-reduced depth throughout, substantially as set forth.

5. A sound record or blank comprising a main portion of substantially the same thickness throughout, impregnated with a mass of fibrous material of substantially the same density throughout and having interior ribs or projections of gradually-reduced depth, substantially as set forth.

6. A sound record or blank comprising a main portion of substantially the same thickness throughout, impregnated with a mass of fibrous material of substantially the same density throughout, and having an interior spiral rib of gradually-reduced depth, substantially as set forth.

7. A sound record or blank comprising a main portion of substantially the same thickness throughout, impregnated with a mass of fibrous material of substantially the same density throughout, and having a plurality of interior spiral ribs of gradually-reduced depth, substantially as set forth.

This specification signed and witnessed this 24th day of December, 1903.

WALTER H. MILLER.

ALEXANDER N. PIERMAN.

Witnesses:

FRANK L. DYER,

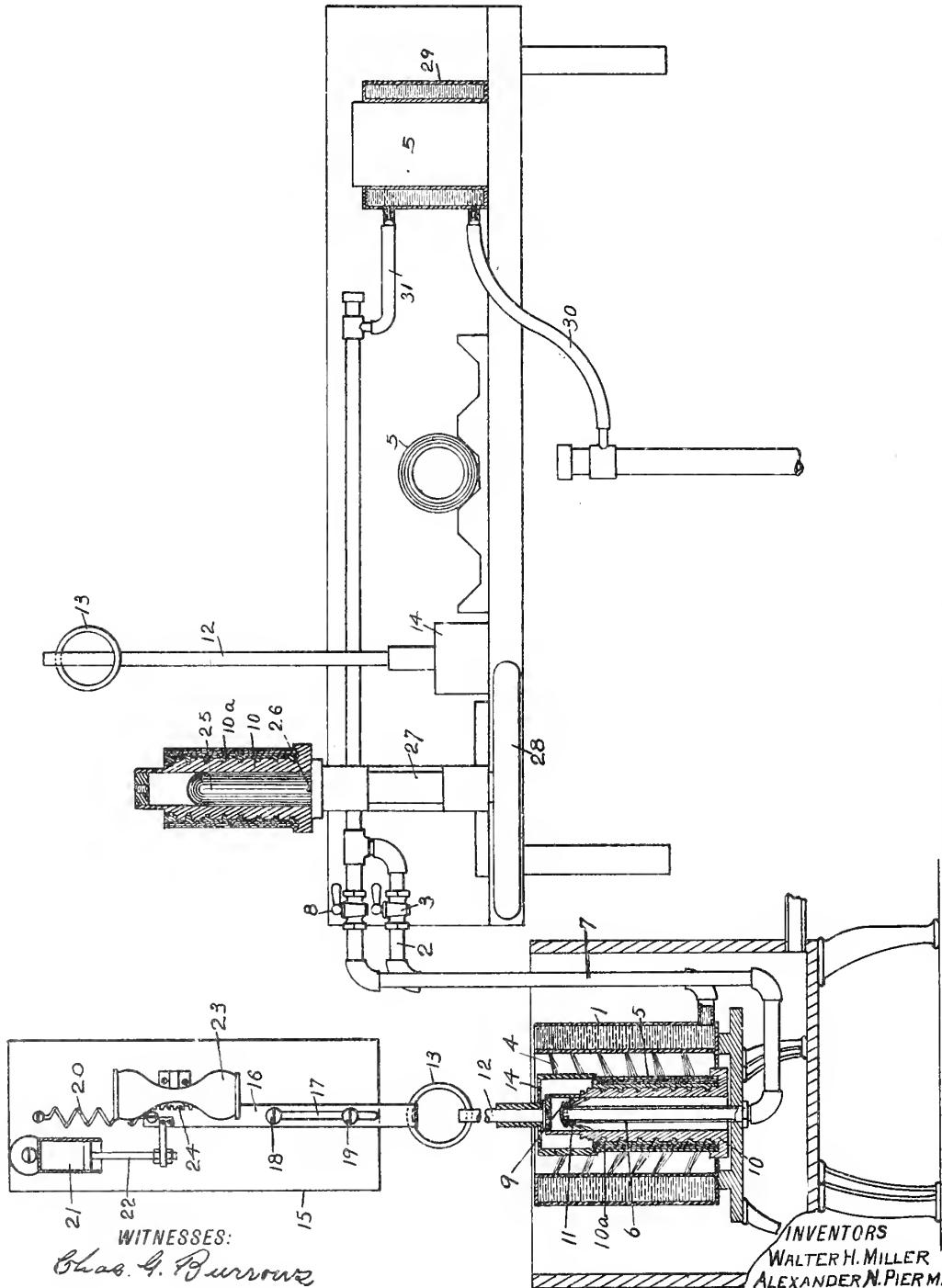
DELOS HOLDEN.



No. 790,518.

PATENTED MAY 23, 1905.

W. H. MILLER & A. N. PIERMAN.
ART OF PRODUCING MOLDED RECORDS OR BLANKS.
APPLICATION FILED MAY 24, 1904.



WITNESSES:
Chas. G. Burrows
Delos Holden

INVENTORS
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BY
Frank L. Lyon
ATTORNEY

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ART OF PRODUCING MOLDED RECORDS OR BLANKS.

SPECIFICATION forming part of Letters Patent No. 790,518, dated May 23, 1905.

Application filed May 24, 1904. Serial No. 209,569.

To all whom it may concern:

Be it known that we, WALTER H. MILLER, a resident of Orange, and ALEXANDER N. PIERMAN, a resident of Newark, county of Essex, State of New Jersey, citizens of the United States, have invented certain new and useful Improvements in the Art of Producing Molded Records or Blanks, of which the following is a specification.

Our invention relates to the production of molded phonograph records and blanks, and has for its object the provision of a process whereby the records and blanks may be produced cheaply and may be removed from their molds in the least possible time and with the least possible injury thereto as regards the surfaces of the said records and blanks.

In producing molded phonograph records and blanks we have found it desirable to use molds composed of a hollow core and a cylindrical matrix surrounding the same and supported thereby. This mold is introduced into a suitable bath of molten material from which the record or blank is to be formed and is then removed therefrom and allowed to cool. It is desirable in order that the records and blanks may be removed from the mold without injury to their surfaces that the mold be chilled or cooled by the application of some cooling medium, such as water. This causes the record or blank to contract, so that the core may be removed therefrom, and upon further cooling the contraction is sufficient to enable the record to be withdrawn longitudinally from the mold without the least injury to the record, which has been formed thereon by the surface of the mold. The present application relates to features whereby the said process may be performed more readily with greater economy and with less danger of injury to the records or blanks than by any other process heretofore known to us.

In the drawing which accompanies this specification we have shown in sectional elevation certain apparatus by means of which our invention may be carried out.

In practicing our invention we prefer to use a cooling device consisting of a cylindrical

water jacket or tank 1, connected with a suitable water-supply by means of a pipe 2, having a valve 3 and provided on its interior surfaces with numerous small apertures through which jets of water may be discharged against the exterior surface of the mold 5. The said cooling device also comprises a vertical pipe 6, supplied with water from a pipe 7, controlled by a valve 8. The top of the pipe 6 is provided with any suitable means 9 which permit the discharge of the water against the interior of the core 10 in the form of a spray or jets 11. The mold 5 is supported by a lateral extension from the core 10. The exterior of the core is provided with a helical groove 10^a for producing a helical rib on the interior of the record or blank. The core is provided with an upwardly-extending rod 12, whose upper end carries a ring 13. Sleeved upon the rod 12 is a cap 14 for inclosing and centering the upper portion of the mold 5.

In the use of a cooling device such as has been described it is desirable that the heated mold be subjected to the action thereof for a definite time, which should not be too great nor yet too small. We therefore make use of a timing device by which the time during which the mold is placed in the cooling device may be indicated. This device, as shown, consists of a base 15, on which is mounted a vertical rack 16, having a slot 17, in which stops 18 and 19 are placed to limit the extreme positions of the said rack. The rack is normally held in its extreme upper position by means of a spring 20, secured at one end to the base 15 and at the other end to the rack 16. The lower end of the rack is bent to form a hook for receiving the ring 13, carried by the rod 12, whereby the rod, core, and mold may be suspended from the rack 16. The weight of these parts draws the rack 16 downward against the action of the spring 20 until stopped by the pin 18. This movement is made slow and regular by means of a dash-pot 21, secured to the base 15 and having a piston whose rod 22 is connected to the rack 16, as shown. The time-indicator consists of a glass 23, containing sufficient sand or other material to indicate

the exact number of minutes or seconds during which it is desired to have the mold and core acted upon by the cooling device. The timing-glass is capable of oscillation about a horizontal axis, being secured to a pinion 24, which meshes with the teeth of the rack 16, the arrangement being such that the vertical movement of the rack causes the pinion to oscillate through an arc of one hundred and eighty degrees. Thus when the mold is hung from the rack 16 the same is lowered, and at the same time the glass 23 is oscillated through an angle of one hundred and eighty degrees, and the sand immediately begins to descend into the empty compartment. As soon as the upper compartment is emptied the operator lifts the mold, removing the ring 13 from the rack 16, and the rack is drawn to its upper position by the spring 20. The timing-glass 23 is thus returned to its original position, and the sand descends to the other compartment, thereby providing for a repetition of the operation upon another mold. The operator then unscrews the rod 12 from the core 10 and places the latter upon the mandrel 25. This mandrel is provided with one or more pins 26, which engage slots or recesses in the lower portion of the core. The mandrel and core are then rotated by means of the shaft 27 and hand-wheel 28, while the mold is held against turning by the operator, with the result that the core is unscrewed from the record or blank contained in the mold. The mold containing the said record or blank is then passed along for further treatment. This treatment consists in placing the mold within a water-jacket 29 until the record or blank is shrunk sufficiently to be removed longitudinally from the mold without injury to the surface thereof. The water-jacket 29 is supplied with a cooling medium from the supply-pipe 30 and leaves the same through an outlet-pipe 31. The outlet 31 is connect-

ed to the pipes 2 and 7 for supplying the cooling device 1. Thus the cooling medium is used when at its lowest temperature in the water-jacket 29 for cooling the partly-cooled mold and then passes to the cooling device 1 for treating the hot molds. By this means we use the water or other cooling medium in the most efficient manner and are able to reduce the quantity required.

In practicing our invention we do not desire to limit ourselves to the use of the structure illustrated, as our invention may be practiced with any apparatus which is adapted thereto.

What we claim, and desire to secure by Letters Patent, is—

1. The process of removing molded phonograph records or blanks from their molds which consists in using a common cooling medium which is first applied to the partly-cooled mold, and then to the matrix of the hot mold, substantially as set forth.

2. The process of removing molded phonograph-records from their molds, which consists in using a common cooling medium which is first applied to the partly-cooled mold, and then to the interior of the core of the hot mold, substantially as set forth.

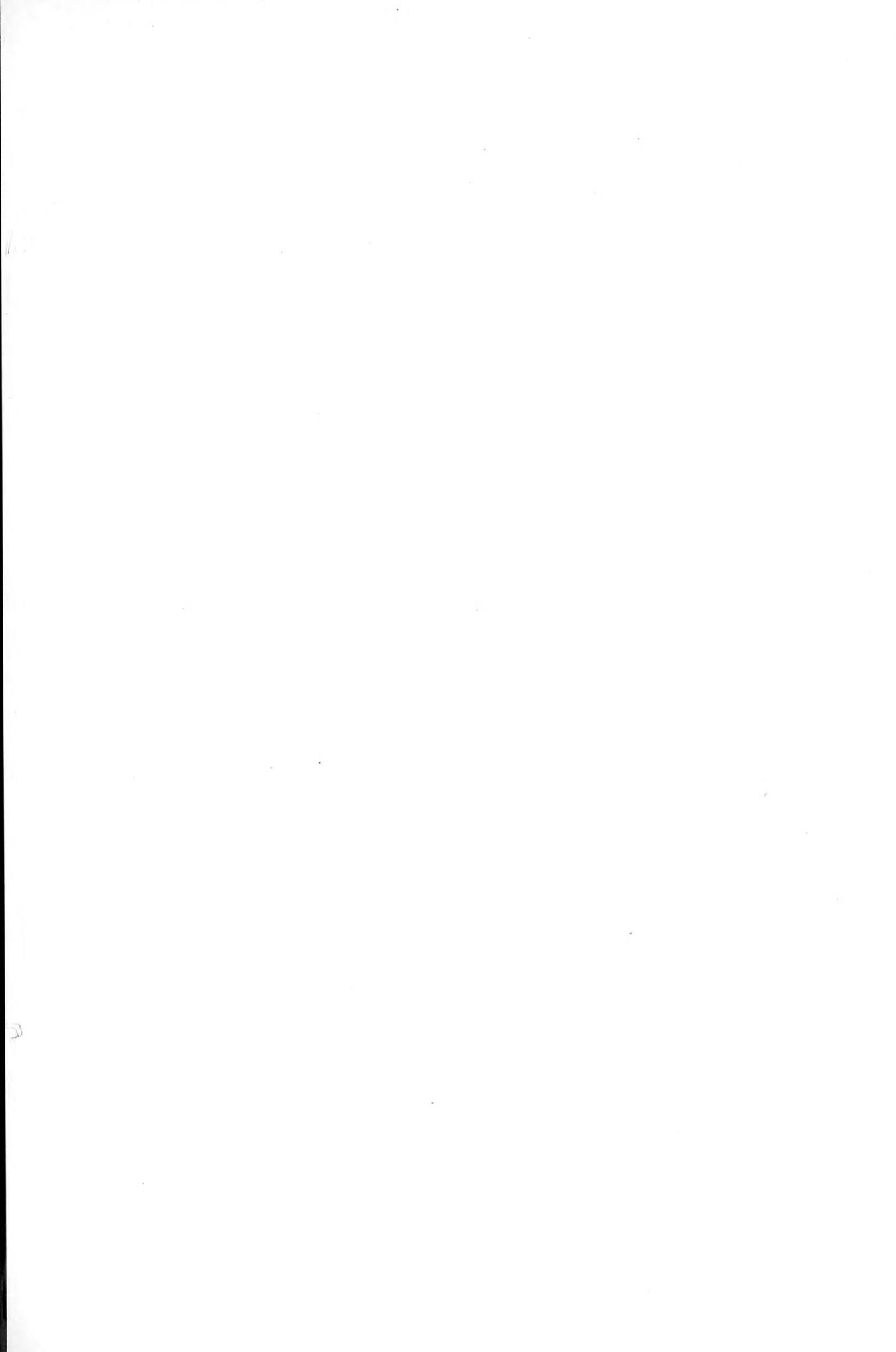
3. The process of removing molded phonograph records or blanks from their molds, which consists in using a common cooling medium, which is first applied to the partly-cooled mold, and then simultaneously to the matrix and core of the hot mold, substantially as set forth.

This specification signed and witnessed this 7th day of May, 1904.

WALTER H. MILLER.
ALEXANDER N. PIERMAN.

Witnesses:

MINA C. MACARTHUR,
FRANK L. DYER.



No. 790,542.

PATENTED MAY 23, 1905.

P. WEBER.
PHONOGRAPHIC RECORDER.
APPLICATION FILED FEB. 11, 1903.

Fig. 1

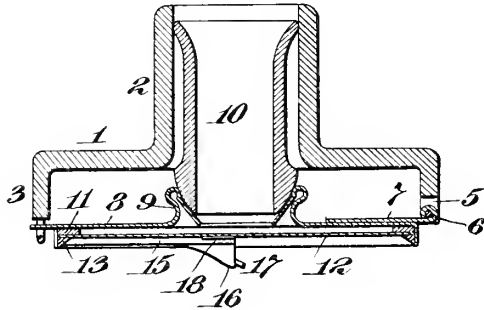
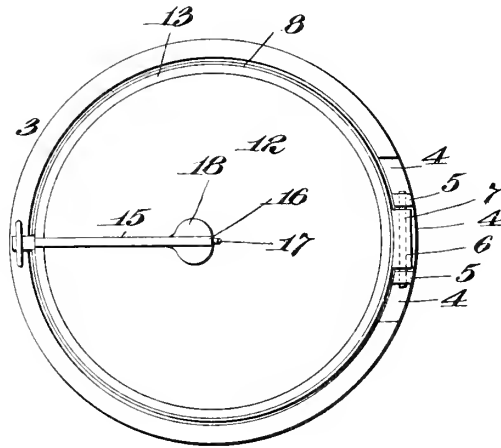


Fig. 2



Witnesses:

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Geo. Robt Taylor

Inventor

Paul Weber
by *Alfred Demaree & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPHIC RECORDER.

SPECIFICATION forming part of Letters Patent No. 790,542, dated May 23, 1905.

Application filed February 11, 1903. Serial No. 142,891.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographic Recorders, of which the following is a description.

My invention relates to improvements in phonograph-recorders in which the diaphragm carrying the stylus is in turn supported and carried by a casing movable by gravity, so as to engage the stylus with the blank, and has for its object to improve the manner of pivotally mounting the diaphragm-casing on the body of the device.

The invention consists in the features hereinafter described and claimed.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a vertical sectional view of a recorder embodying one form of my invention, and Fig. 2 a bottom plan view thereof.

In the above views corresponding parts are represented by the same numerals of reference.

The body 1 is of the usual form, being provided with the usual neck or bore 2 and the depending annulus or flange 3. This flange is cut away at 4 4 4 to form lugs 5 5, through which a straight pivot-pin 6 may be passed from either side. This provides for a very simple and cheap mode of manufacture. Pivoted on the pin 6 is a lug 7, which is secured to a disk-like casing 8 by soldering or otherwise. The casing 8 is made of sheet metal preferably stamped in one piece and at its center is formed with an opening having a beaded rim 9. A weighted tube 10 is preferably employed, resting at its lower end on the bead 9 to form a ball-and-socket joint and at its upper end engaging the bore 2, so that the tube is capable of vertical movement with respect to the body 1 and always exerts the de-

sired weight upon the stylus. In the preferred form the casing 8 is provided with a metallic washer 11, on which rests the diaphragm 12, made usually of glass or mica. This diaphragm is held in position on the washer 11 by a plastic sealing 13 of wax or similar material. Cemented to the diaphragm 12 is a rib 15, formed with an integral web 16, constituting a socket for receiving the recording-stylus 17. The rib is preferably also formed with flat integral wings 18, which are cemented in place to the diaphragm at or near its center, whereby a very firm and rigid support is offered for the stylus. The rib 15 being cemented to the diaphragm throughout its length and running from the center to the periphery of the diaphragm serves to stiffen the diaphragm sufficiently to prevent objectionable buckling thereof without interfering in any way with the sensitiveness of the diaphragm for recording ordinary sounds.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a phonograph-recorder, the combination with a body having a depending flange formed with cut-away portions to constitute a lug, of a casing pivoted to said lug, a diaphragm carried by said casing, and a recording-stylus connected to the diaphragm, substantially as set forth.

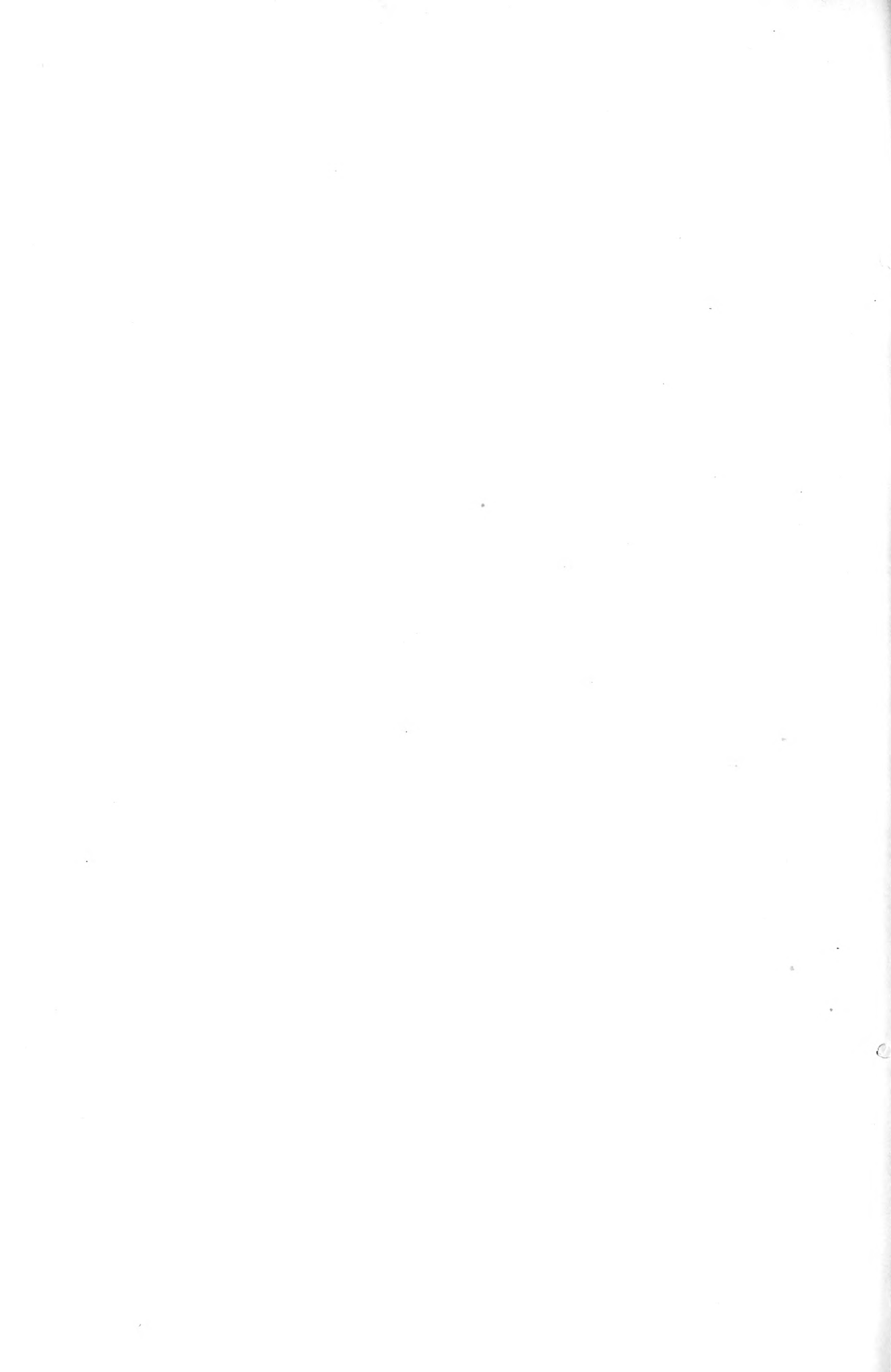
2. In a phonograph-recorder, the combination with a body having a depending flange formed with cut-away portions to form a pair of lugs, of a casing pivoted between said lugs, a diaphragm carried by said casing, and a recording-stylus connected to the diaphragm, substantially as set forth.

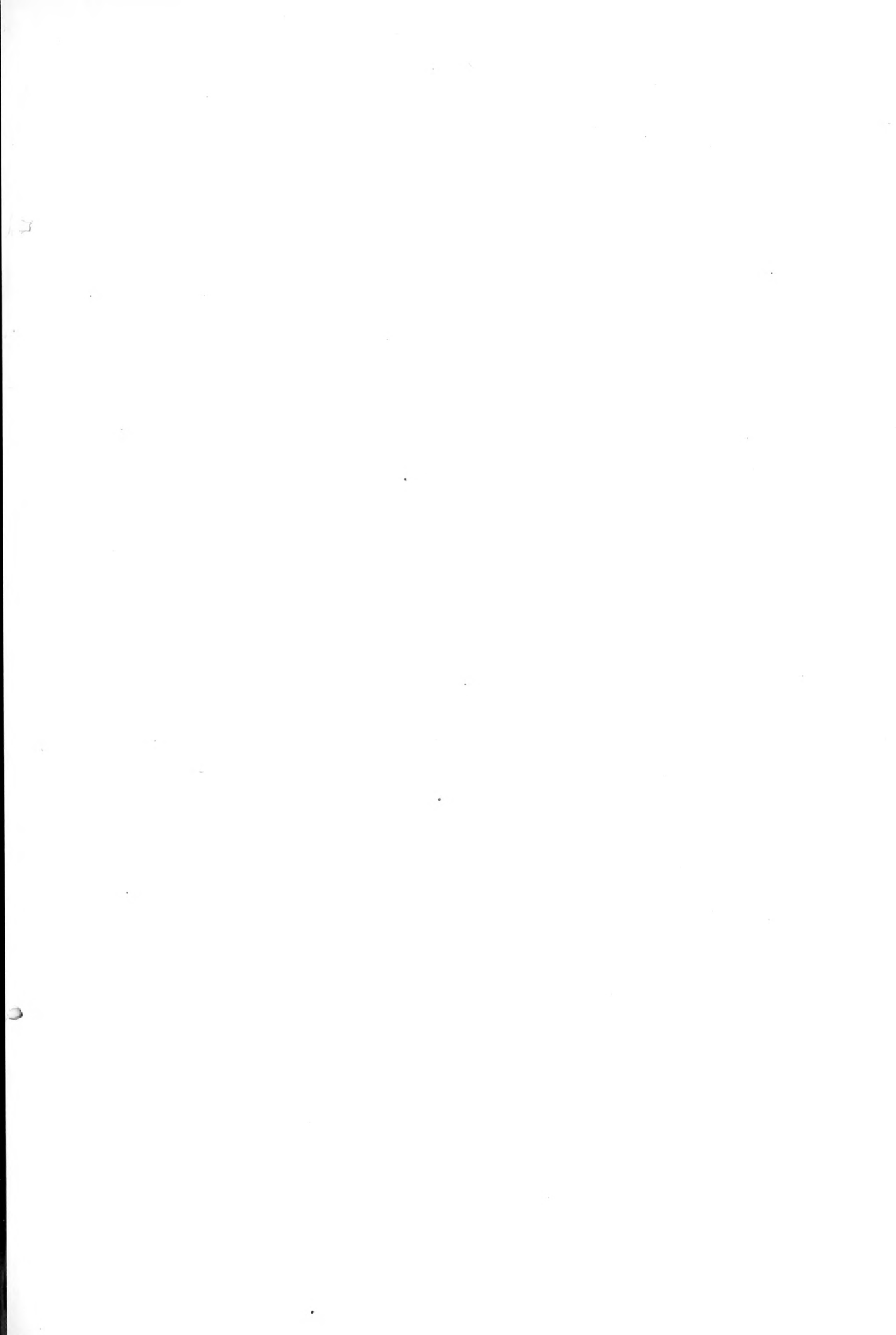
This specification signed and witnessed this 4th day of February, 1903.

PETER WEBER.

Witnesses:

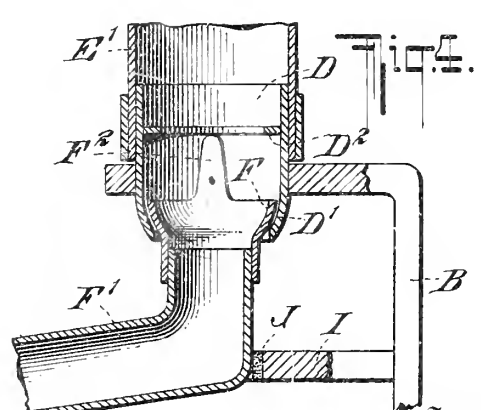
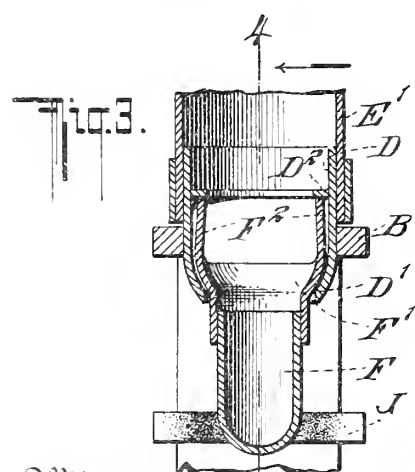
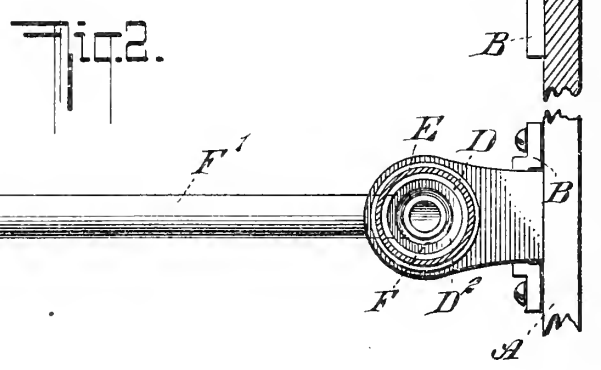
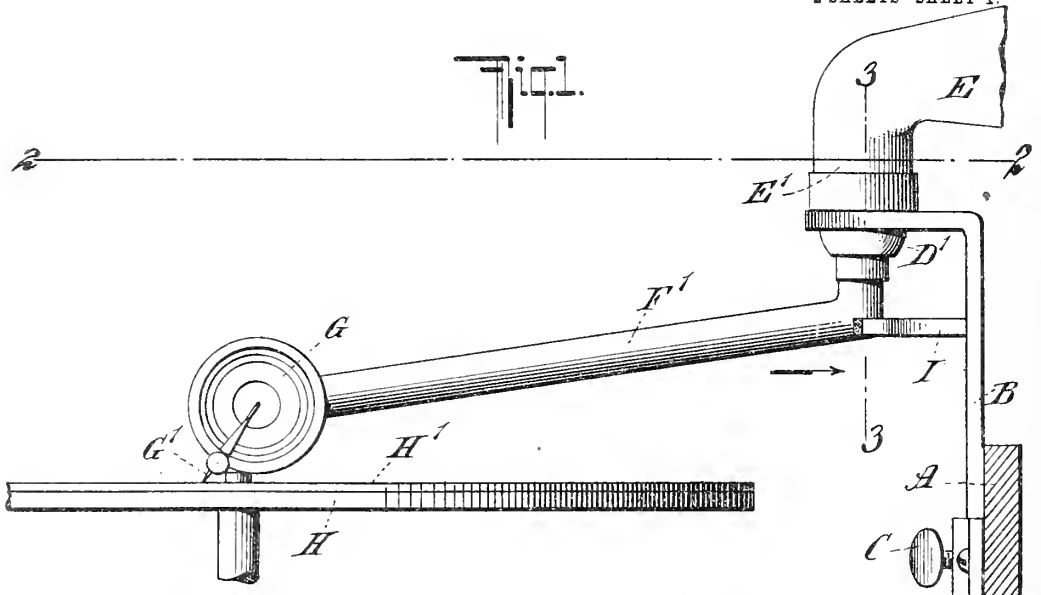
HARRY F. MILLER,
W. J. BUEHLER.





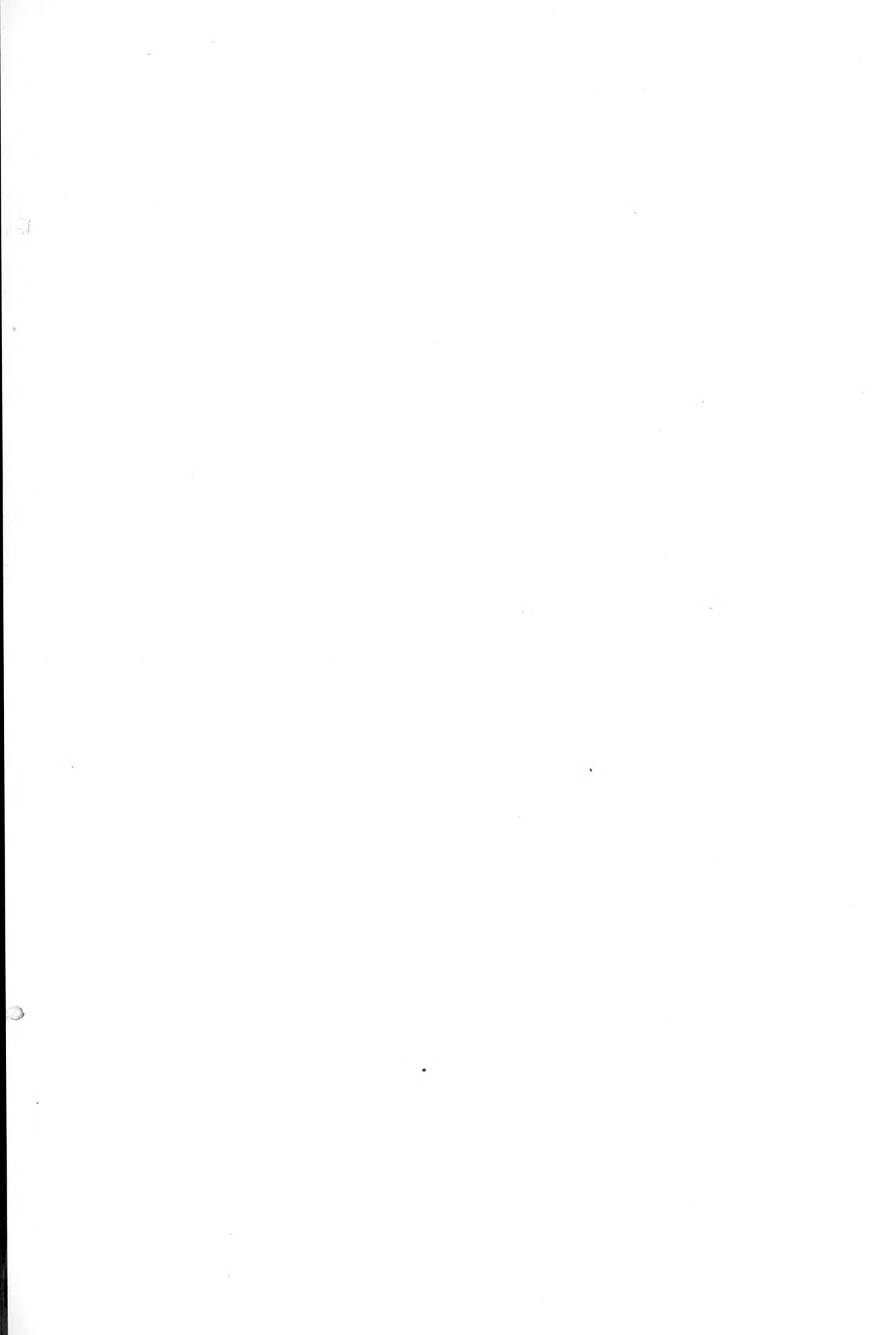
A. C. WIECHERS.
SOUND CONDUCTOR FOR TALKING MACHINES.
APPLICATION FILED AUG. 8, 1904.

2 SHEETS—SHEET 1.

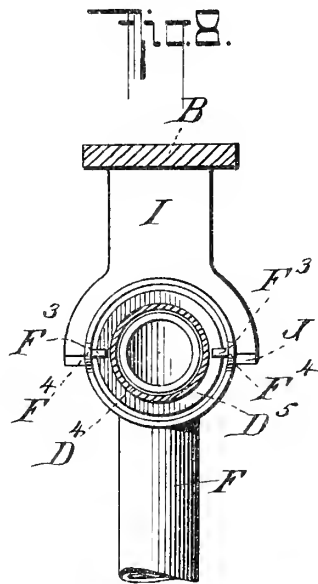
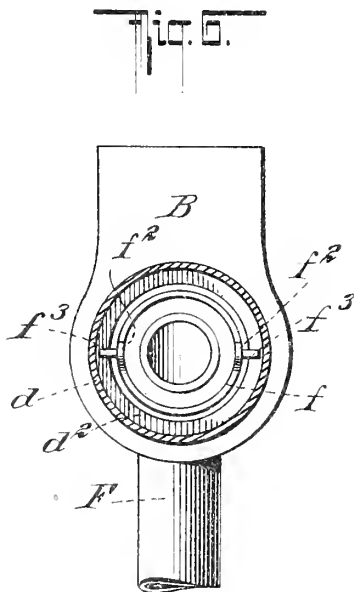
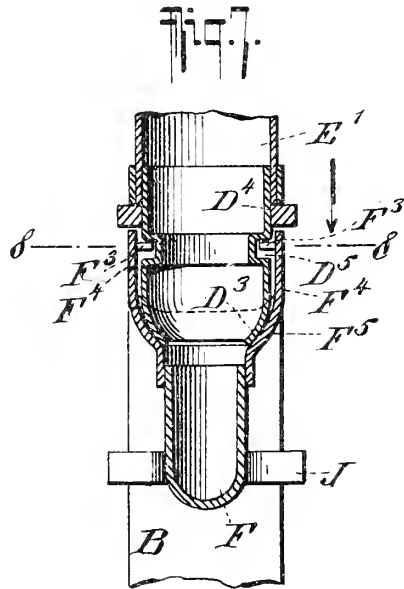
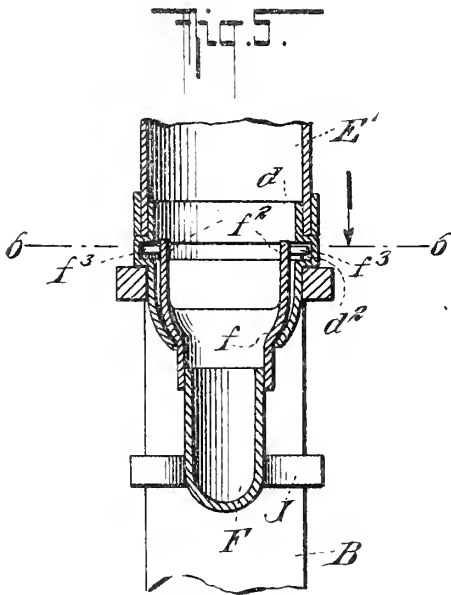


Witnesses
Julius H. Hart
John Lotka

Inventor
Albert C. Wiechers.
 By his Attorneys
Brisson & Maunth



A. C. WIECHERS.
SOUND CONDUCTOR FOR TALKING MACHINES.
APPLICATION FILED AUG. 8, 1904.



Witnesses
Julius Schatz
John Laska

Inventor
Albert C. Wiechers
 By his Attorneys
Brisson & Stranetto

UNITED STATES PATENT OFFICE.

ALBERT C. WIECHERS, OF NEW YORK, N. Y., ASSIGNOR TO THE REGINA COMPANY, OF RAHWAY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-CONDUCTOR FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 790,546, dated May 23, 1905.

Application filed August 8, 1904. Serial No. 219,830.

To all whom it may concern:

Be it known that I, ALBERT C. WIECHERS, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Sound-Conductors for Talking-Machines, of which the following is a specification.

My invention relates to sound-conductors for talking-machines, such as are employed for conveying the sound from the vibrating diaphragm to the amplifying horn. Inasmuch as a joint has to be provided in this conductor, in view of the fact that the reproducer is loosely mounted, so as to follow the record in its movements, considerable difficulty has been experienced owing to the rattling of the metallic parts at the joint, and even when metallic parts are avoided the practical results hitherto have not been satisfactory.

The object of my present invention is to improve the joint between that part of the sound-conduit which is connected with the horn and the part of the conduit leading to the reproducer. The joint provided by my invention allows the reproducer to swing freely in a horizontal plane and also allows it to swing freely in that vertical plane which passes through the reproducer and the adjacent portion of the sound-conduit. Any other vertical movement of the reproducer and sound-conduit is, however, prevented.

In the accompanying drawings I have illustrated a specific embodiment of my invention.

Figure 1 is a side elevation of a talking-machine sufficient to explain my invention. Fig. 2 is a sectional plan on line 2 2 of Fig. 1. Fig. 3 is a sectional elevation on line 3 3 of Fig. 1. Fig. 4 is a sectional elevation on line 4 4 of Fig. 3. Figs. 5 and 7 are sectional elevations of two other forms of my invention; and Figs. 6 and 8 are sectional plans on line 6 6 of Fig. 5 and line 8 8 of Fig. 7, respectively.

A indicates a portion of the stationary frame of the machine, to which a bracket B is secured by means of a set-screw C, the said

bracket carrying a socket D, upon which is fitted the tubular end E' of the amplifying-horn E. The horn therefore is stationary, but may, if desired, be adjusted to point in one direction or another. The lower portion of the socket D has a spherical curvature, as indicated at D', and is centrally apertured at the bottom to receive a spherically-rounded tubular bearing member F, which is rigidly secured to the upper end of the sound-conducting tube F', said upper end of the tube being normally vertical. The opening in the bottom of the socket D is, however, large enough to allow the bearing member F and the tube F' to swing, thus permitting of an up-and-down movement of the tube F'. This tube at its free end carries the reproducer G, of any suitable construction, which reproducer is adapted to cooperate with the record H', carried on the rotary record-support H. In the normal position the sound-conducting tube F' may rest against a fork I, projected from the bracket B and having a lining J of soft material. In order that the tube F' may swing only up and down without any lateral movement, such as would bring the diaphragm of the reproducer out of its vertical position, I provide the bearing member F with two lugs F², extending upwardly therefrom and adapted to engage a ledge D² within the socket D. These lugs will allow the bearing member F to swing vertically only in a plane corresponding to that of the reproducer-diaphragm—that is, the lugs F² should be so arranged that a line or diameter connecting them in a horizontal plane will be at a right angle to the plane of the reproducer-diaphragm. The reproducer can thus follow the record in all of its movements, yet the diaphragm will always be kept in a vertical position, or, in other words, at a right angle to the surface of the record, and at the same time a tight joint is obtained which conducts the sound uniformly well irrespective of the movement of the bearing member F.

In the form of construction illustrated by Fig. 5 the bearing member F' is provided at the upper ends of the lugs F² with pins F³,

projecting outwardly into an angular groove d^2 in the socket d . This construction obviously has the same functions and advantages as the one first described, and, moreover, in this case one lug f^2 , with its pin f^3 , will be sufficient.

As indicated in Fig. 6, the movable member fits over the stationary member instead of into the same. The construction is otherwise very similar to that shown in Fig. 5, the stationary member having a spherically-curved end D^3 and a cylindrical portion D^4 , provided with an annular groove D^2 , adapted to receive pins F^3 upon lugs F^4 , projected from the spherically-curved portion F^5 of the movable member. In this case also it will be sufficient to employ one lug and pin, although the provision of two is preferable.

In each of the constructions shown the joint consists of two members, one stationary and the other movable, said movable member having a connecting portion which normally is in axial alinement with the adjacent portion of the stationary member. The movable member is capable of swinging up or down in a plane parallel to that of the diaphragm of the reproducer, or, more strictly speaking, parallel to the plane of the stylus G' , so that whatever movement the tube F' performs the said stylus will always have its end in a plane perpendicular to that of the record H' .

The lugs F^2 , f^2 , or F^4 , which extend adjacent to the cylindrical portion of the stationary member, should not be too close to the said surface; but some play should be allowed. In fact, it is not necessary nor even intended that the said lugs should engage the cylindrical surface. The operative portion of the said lugs is their end where they engage the flange D^3 in the construction illustrated by Figs. 1 to 4, or, in the construction illustrated by Figs. 5 and 6, the lugs serve only as supports for the pins f^3 F^3 , these pins performing the same function as the ends of the lugs F^2 in the form of construction first described.

Various modifications may be made without departing from the nature of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. A sound-conductor for talking-machines, comprising a stationary member having a cylindrical portion and a portion of spherical curvature, in combination with a movable member connected with the reproducer and having a portion of spherical curvature engaging the corresponding portion of the stationary member, said movable member having a projection adjacent to the cylindrical

portion of the stationary member, and the latter being formed with a surface forming a stop or abutment for said projection to restrict the swinging of the movable member to a predetermined direction.

2. A sound-conductor for talking-machines, comprising a stationary tubular member and a movable tubular member, the latter being connected with the reproducer, each of said members being formed with curved engaging surfaces forming a joint and the movable member being also formed with projecting portions which restrict the swinging of the movable member to a predetermined direction.

3. A sound-conductor for talking-machines, comprising a tubular stationary member and a tubular movable member connected with the reproducer, said members being provided with engaging surfaces which allow the movable member to swing in a predetermined plane, the movable member being also provided with projections arranged to follow its movement and to engage a corresponding surface on the stationary member, to restrict the swinging of the movable member to a predetermined direction relatively to its first-named plane of motion.

4. A sound-conductor for talking-machines, comprising a stationary tubular member and a movable tubular member having their adjacent portions in substantial alinement, the said members being connected by a joint allowing the movable member to swing about the axis of its connecting portion, and said movable member being also provided with portions engaging the stationary member and allowing the said movable member to swing in only one of the planes perpendicular to that of its first-mentioned movement.

5. A sound-conductor for talking-machines, comprising a stationary member and a movable member, the connecting portions of which are substantially in axial alinement and are provided with spherically-curved engaging surfaces, the movable member being provided with a projection engaging a limiting-surface on the stationary member to keep the movable member from swinging in any plane except one of those which are perpendicular to the plane of its movement about its connecting portion.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALBERT C. WIECHERS.

Witnesses:

JOHN LOTKA,

JOHN A. KEHLENBECK.



L. P. VALIQUET.
SOUND BOX.

APPLICATION FILED OCT. 1, 1903.

2 SHEETS—SHEET 1.

Fig. 2.

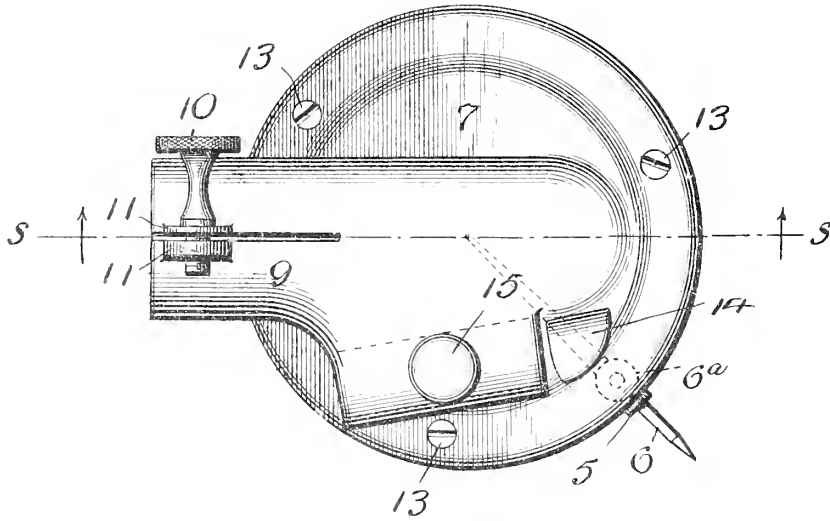
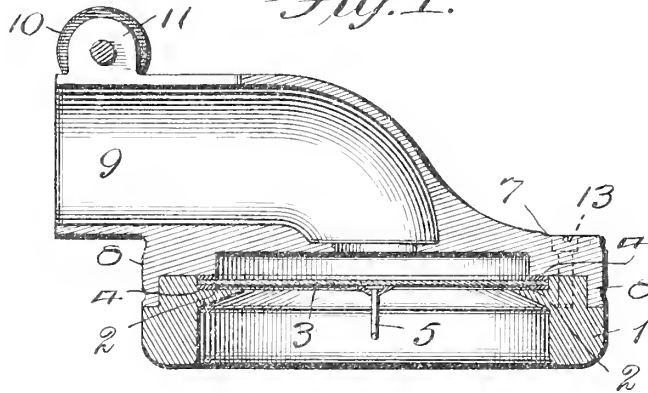
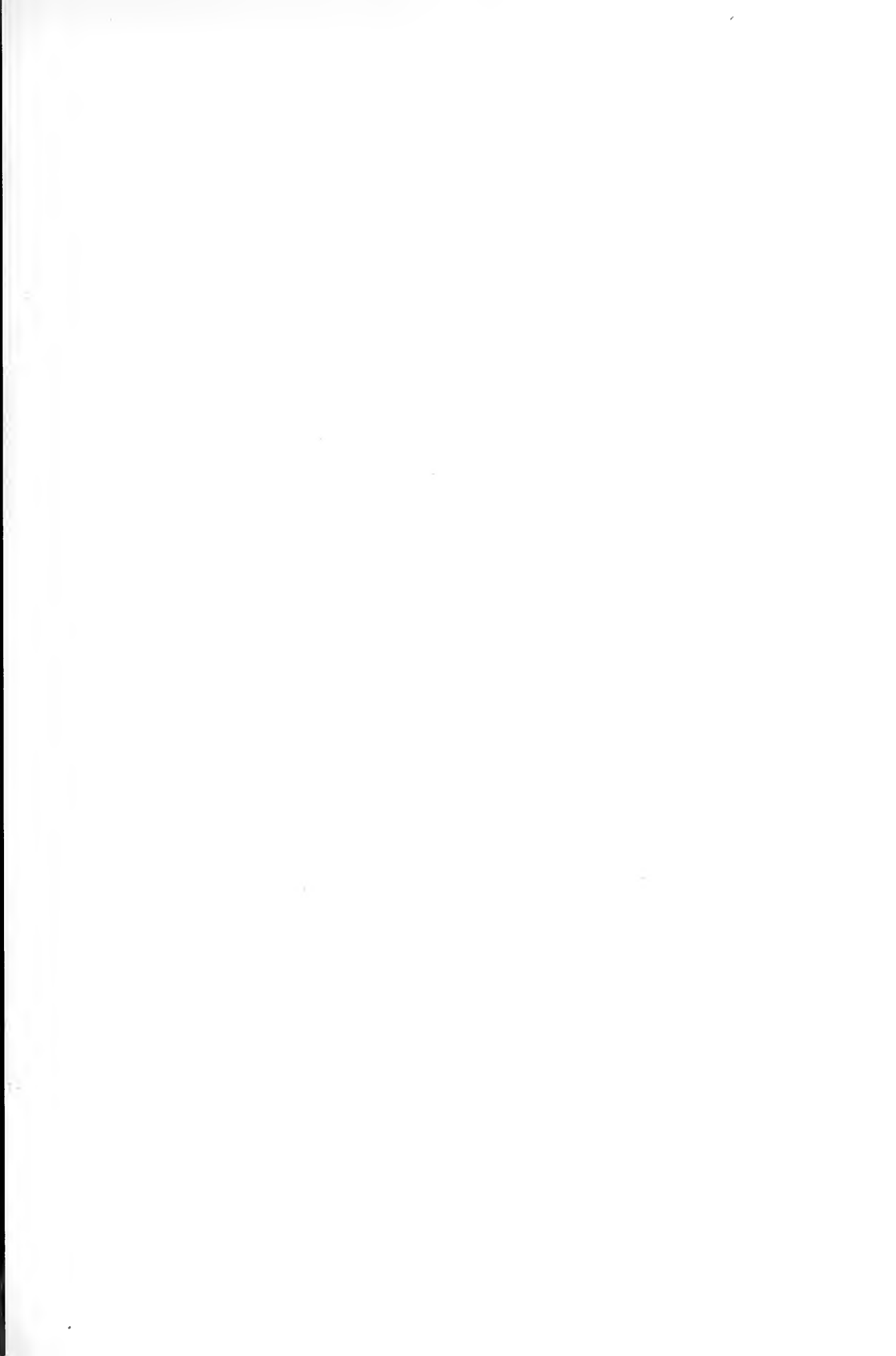


Fig. 1.



Witnesses
 Frank O'Connor
 M. G. Crawford

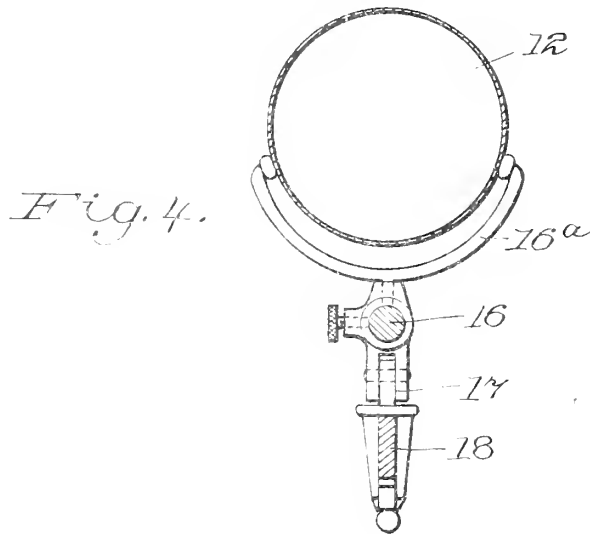
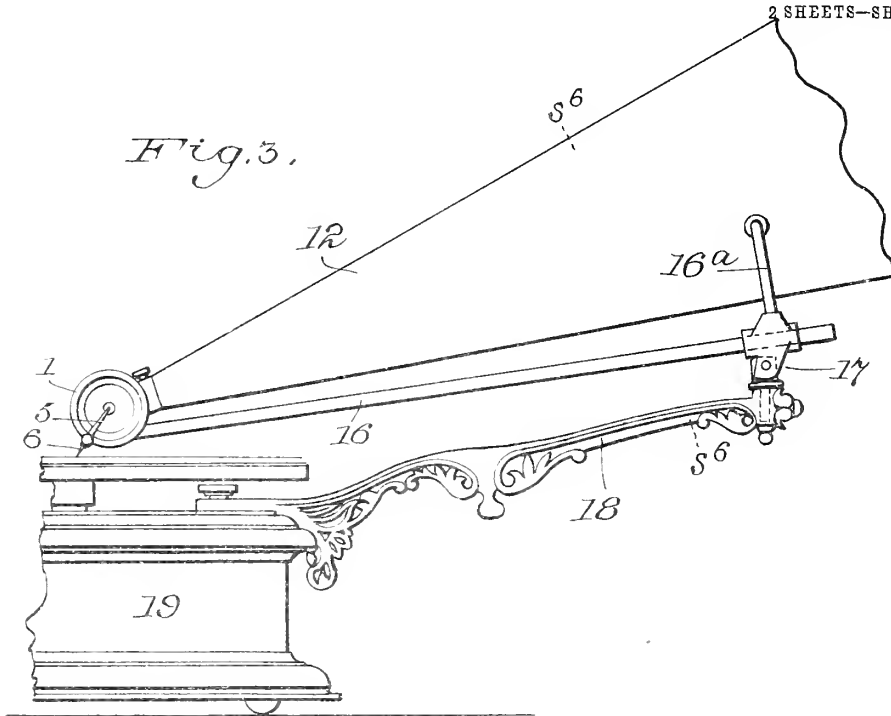
Inventor
 Louis P. Valiquet
 by A. Parker Smith
 Attorney



L. P. VALIQUET.
SOUND BOX.

APPLICATION FILED OCT. 1, 1903.

2 SHEETS—SHEET 2.



WITNESSES

W. H. Sampson
M. G. Crawford

INVENTOR

Louis P. Valiquet
BY
A. Parker Smith
ATTORNEY

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 791,595, dated June 6, 1905.

Application filed October 1, 1903. Serial No. 175,303.

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of the borough of Bronx, city, county, and State of New York, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

My invention relates generally to talking-machines, and more particularly to the construction and mounting of sound-boxes employed in connection therewith.

The object of the invention is to adapt the sound-box for use in connection with a straight horn by forming the elbow in part with one member of the sound-box casing and at the same time centering the sound-box-supporting arm relatively beneath the horn, so that the various parts are more nearly balanced, more compact, and present a neat and finished appearance.

The preferred form of apparatus embodying my invention is illustrated in the accompanying two sheets of drawings, throughout the several views of which like reference-numerals indicate corresponding parts.

In the drawings, Figure 1 is a sectional view of the sound-box, taken on the line $s' s'$ of Fig. 2. Fig. 2 is a view in rear elevation. Fig. 3 is a view in elevation, showing the sound-box mounted on a talking-machine; and Fig. 4 is a cross-sectional view thereof, taken on the line $s^6 s^6$ of Fig. 3.

Referring to the drawings, 1 represents the front or annular member of the sound-box casing, the same being internally flanged to provide a seat 2 for the diaphragm 3, which is mounted thereon between gaskets 4 4, of rubber or other material, in the usual manner. The stylus-arm 5 has one end waxed or otherwise phonetically connected to the diaphragm and the opposite end socketed to receive the needle 6, which is secured therein by the set-screw 6^a. The stylus-arm is fulcrumed in the ring member of the casing to vibrate in the usual manner in opposition to a retractile or centering spring. (Not shown.)

The rear member or back of the casing 7 is flanged, as at 8, to form a telescoping con-

nection with the front member and is cast in one piece with a tubular elbow 9, which is split at its outer end and provided with a set-screw 10, working in lugs 11, to serve as a clamp in securing a horn or trumpet 12 in position. The members of the sound-box casing are secured together by screws 13 13. (Shown in Fig. 2 and indicated by dotted lines in Fig. 1.) An opening or socket 14 and set-screw 15 are also provided in the back member to receive and clamp the free end of a rod 16, which supports both the sound-box and lower end of the horn. This rod is connected by a universal joint 17 with a fixed supporting-arm 18, extending outward from the motor-box 19 of the machine.

In use the sound-box is mounted on the free end of the rod 16, which is squared or otherwise formed to fit into the socket or opening 14 thereof and is secured by the set-screw 15. The horn is connected by having a terminal nipple thereof clamped in the tubular elbow extension of the sound-box casing and is centered above the supporting-arm 18 and the rod 16 in an approximately Y-shaped rest 16^a.

In operation, as the diaphragm vibrates under the action of the stylus-arm, &c., such vibrations are transmitted by the body of air in the chambers in the rear of the diaphragm to the column of air within the horn.

Some of the main advantages of my invention are as follows: By having the elbow connected directly with the casing of the sound-box the parts are simplified and the sound-conducting passage made much more even and uniform throughout its length. The parts are also much more definitely and securely held in position and balanced, while at the same time the arrangement allows quick and free adjustment, thereby insuring greater accuracy in the placing of the sound-box and the stylus-bar in their operative positions.

It will be understood that I do not wish to limit myself to the exact detail construction and arrangement shown, as various changes may be made without departing from the spirit and scope of my invention. All such changes, however, I consider obvious and immaterial variations of form and not of substance and

still within the meaning of the present invention.

Having, therefore, described my invention, I claim—

- 5 1. In a sound-box for talking-machines, a casing, an elbow rigidly connected thereto, the outer end of said elbow being split and means for drawing the split portions of said elbow together.
- 10 2. In a sound-box for talking-machines, a casing, an elbow rigidly connected thereto, means for clamping the outer end of said elbow about the end of an amplifying-horn and a socket also carried by said casing and adapted to adjustably receive the end of the sound-box-supporting arm.
- 15 3. In a sound-box for talking-machines, a casing, an elbow integrally connected thereto, means for clamping the outer end of said elbow

about the end of an amplifying-horn, an independent socket carried by said sound-box adapted to adjustably receive the end of the sound-box-supporting arm. 20

4. In a sound-box for talking-machines, the combination with a casing having an integral elbow, means for clamping said elbow about the end of an amplifying-horn or other sound-conveying means, an integral projection also carried by said casing having an opening therein adapted to receive the sound-box-supporting arm and means for adjustably clamping said arm within said opening. 25 30

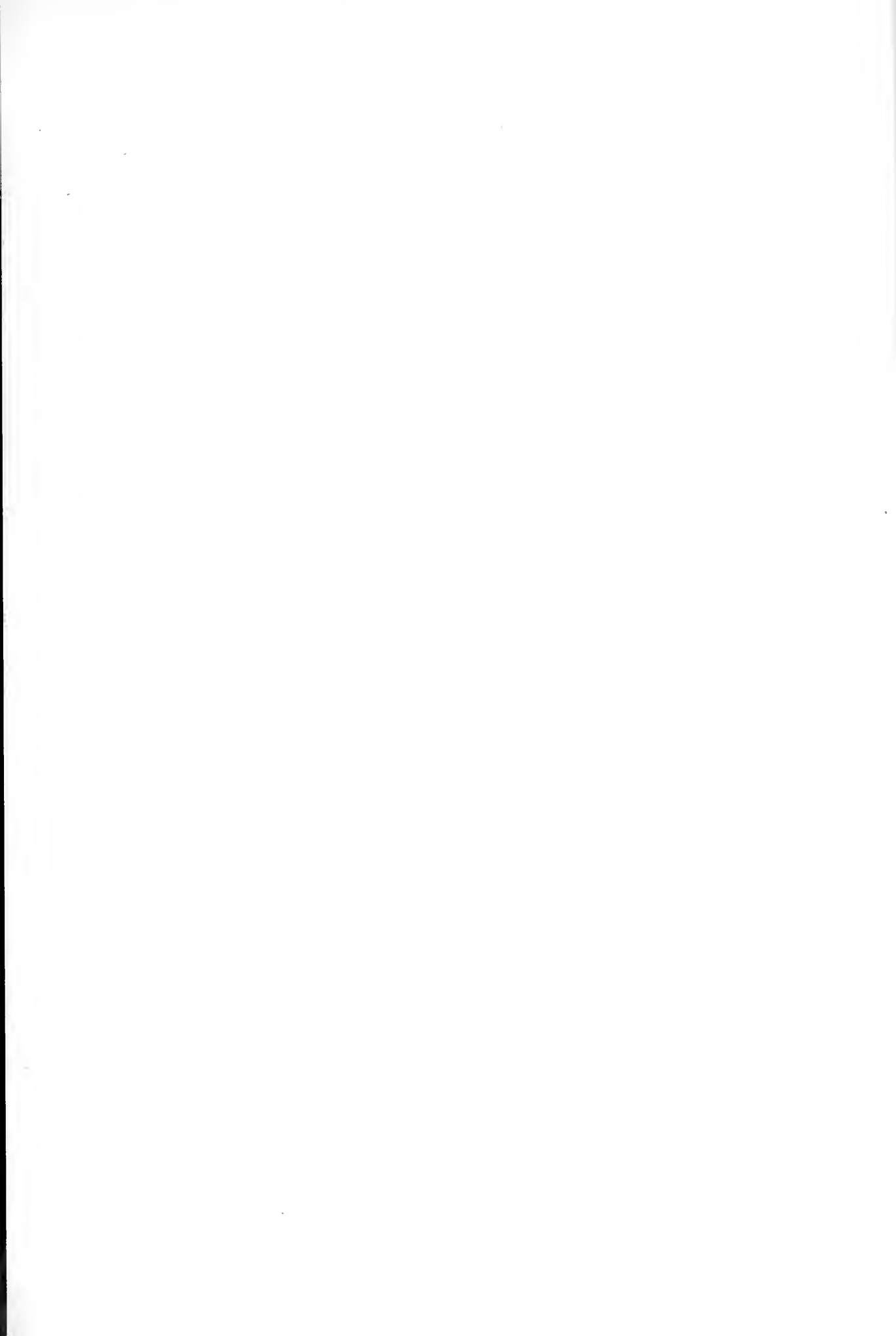
Signed at New York, N. Y., this 21st day of September, 1903.

LOUIS P. VALIQUET.

Witnesses:

J. E. PEARSON,

M. G. CRAWFORD.



G. KÖNIGSTEIN.
GRAMOPHONE ATTACHMENT.
APPLICATION FILED SEPT. 15, 1904.

FIG. 1.

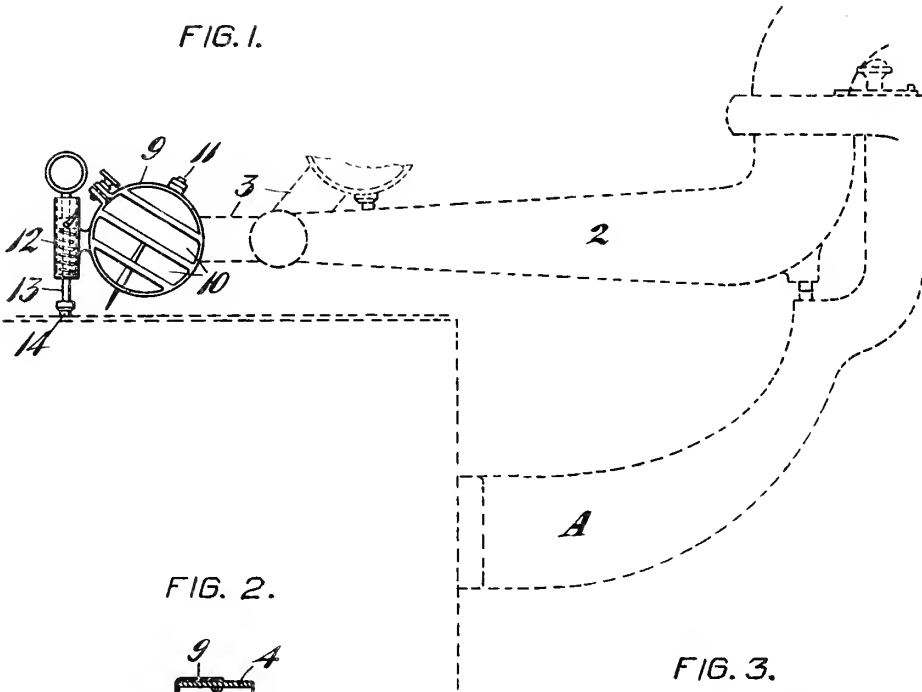


FIG. 2.

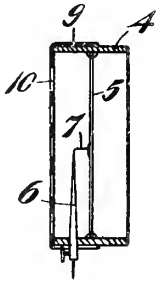


FIG. 3.

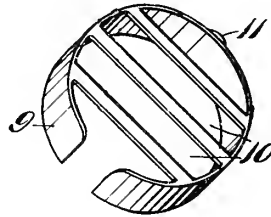


FIG. 4.

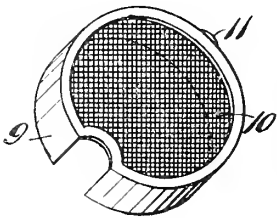
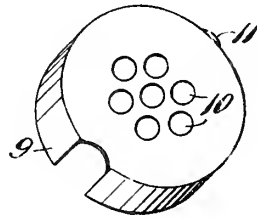


FIG. 5.



WITNESSES,

Chas. F. Chapin.

G. H. Morse

INVENTOR,

Gabor Königstein
By *Geo. H. Strong* atty

UNITED STATES PATENT OFFICE.

GABOR KÖNIGSTEIN, OF SAN FRANCISCO, CALIFORNIA.

GRAMOPHONE ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 792,779, dated June 20, 1905.

Application filed September 15, 1904. Serial No. 224,525.

To all whom it may concern:

Be it known that I, GABOR KÖNIGSTEIN, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Gramophone Attachments, of which the following is a specification.

My invention relates to an attachment which is designed for use in conjunction with the movable arms of gramophones or talking-machines; and it is especially designed to protect the diaphragm and its attachments from injury.

My invention consists of the parts and the constructions and combinations of parts which I will hereinafter describe and claim.

Figure 1 shows application of my improved attachment. Fig. 2 is a sectional view of diaphragm and ring. Fig. 3 is a perspective view of my attachment. Figs. 4 and 5 are modified forms of same.

In the present drawings I have only shown a sufficient portion of the machine to illustrate the attachment of my device.

The fixed arm A has the arm 2 swiveled and turnable upon it. At the outer end of this arm 2 is the U-shaped arm 3, which is swiveled and freely turnable transversely to the end of the arm 2. The free end of the arm 3 carries the ring 4, within which ring is the diaphragm 5 and the socket or support 6 for the needle or stylus which follows the undulations of the record-disk when the machine is in operation. The inner end of the socket 6 has a light fragile connection 7 between itself and the center of the diaphragm 5, and through this connection the articulate or other sounds are transmitted. This apparatus is subject to injury on account of its delicate nature, and especially in careless handling, as the arm 3, carrying the ring 4 and the attached parts, is frequently turned upward and backward to rest upon the arm 2 when not in use and thrown forward and downward, so that the stylus will engage with the record-disk, when it is to be used. In effecting these movements there is danger that the operator will carelessly touch and disarrange the delicate transmitting mechanism, and for the purpose of protecting these parts from such injury

and at the same time allowing a free passage of sounds I have shown a cylindrical cap, as at 9, adapted to inclose the ring 4, this cap having bars, perforations, reticulations, or other form of opening sufficient to permit the free passage of tones, at the same time being sufficient to prevent any accidental contact with the delicate interior portions. This cylindrical cap may be independent of the ring 4 and adapted to fit over it, as shown, and in this case it may carry upon one side a cushion, as at 11, which when the arm 3 is turned back will rest upon the arm 2 and prevent injury to this arm, which for convenience is usually made of very thin light metal. This ring may also carry a sleeve 12, within which is a reciprocating spring-pressed plunger, the shank 13 of which is turned downward and carries upon its lower end a cushion, as at 14, of such a character as to prevent the stylus or needle from striking the record-disk when the arm 3 is first turned down to bring the stylus into proper position.

It will be understood that the cap-shaped member or grill is preferably a mere attachment made independent of the usual sound-box, and therefore is capable of being fitted to boxes now in use. It forms no permanent part of the box, and it can be removed at any time without disarranging the component parts of the box.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a gramophone, of a sound-box comprising a transmitting-disk and a stylus and support therefor, and an attachment removably fitted to the box and serving as a protection for the stylus said attachment provided with openings to permit the passage of sound-waves.

2. The combination with a sound-box having a stylus, a diaphragm and stylus-support, of a cap-shaped grill removably fitted to the box and serving as an attachment therefor, and as means for protecting the stylus-support without obstructing the passage of the sound-waves.

3. The combination with a sound-box having a stylus, a diaphragm and a stylus-support,

of a shiftable cap-shaped attachment removably fitted to the box to serve as a protector for the stylus, said attachment having openings for the passage of sound-waves, and having cushion means for further protecting the stylus from sudden shock.

4. In a machine of the character described, a sound-box including a diaphragm, a stylus and a stylus-support, in combination with a readily-removable covering placed in front of the stylus-support to protect the same from injury said covering made perforate to permit the passage of sound-waves.

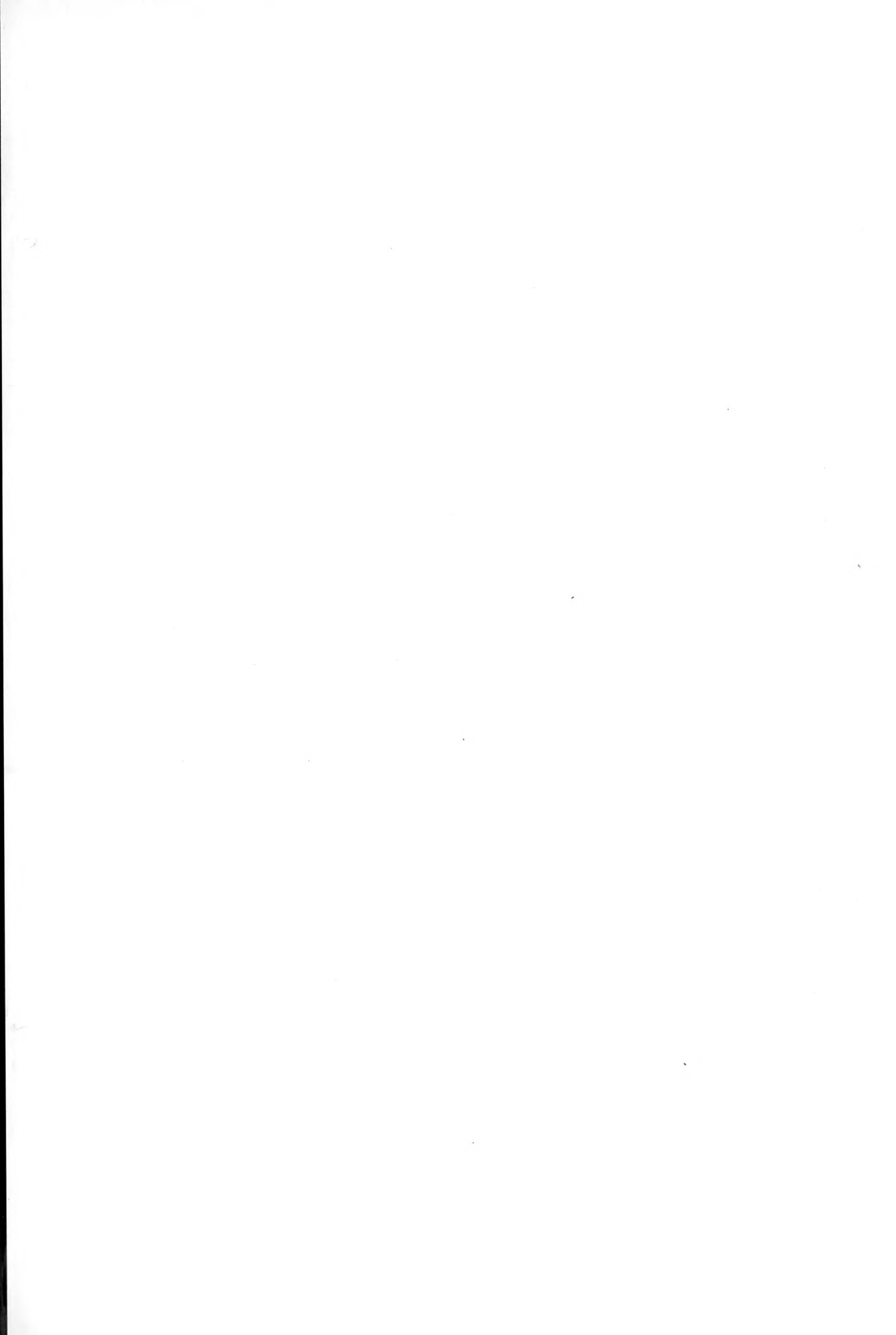
5. A readily-attachable and removable cap-shaped member adapted to fit the sound-box of a gramophone, said member serving to protect the stylus-support of the box and being made perforate to permit the free passage of sound-waves.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GABOR KÖNIGSTEIN.

Witnesses:

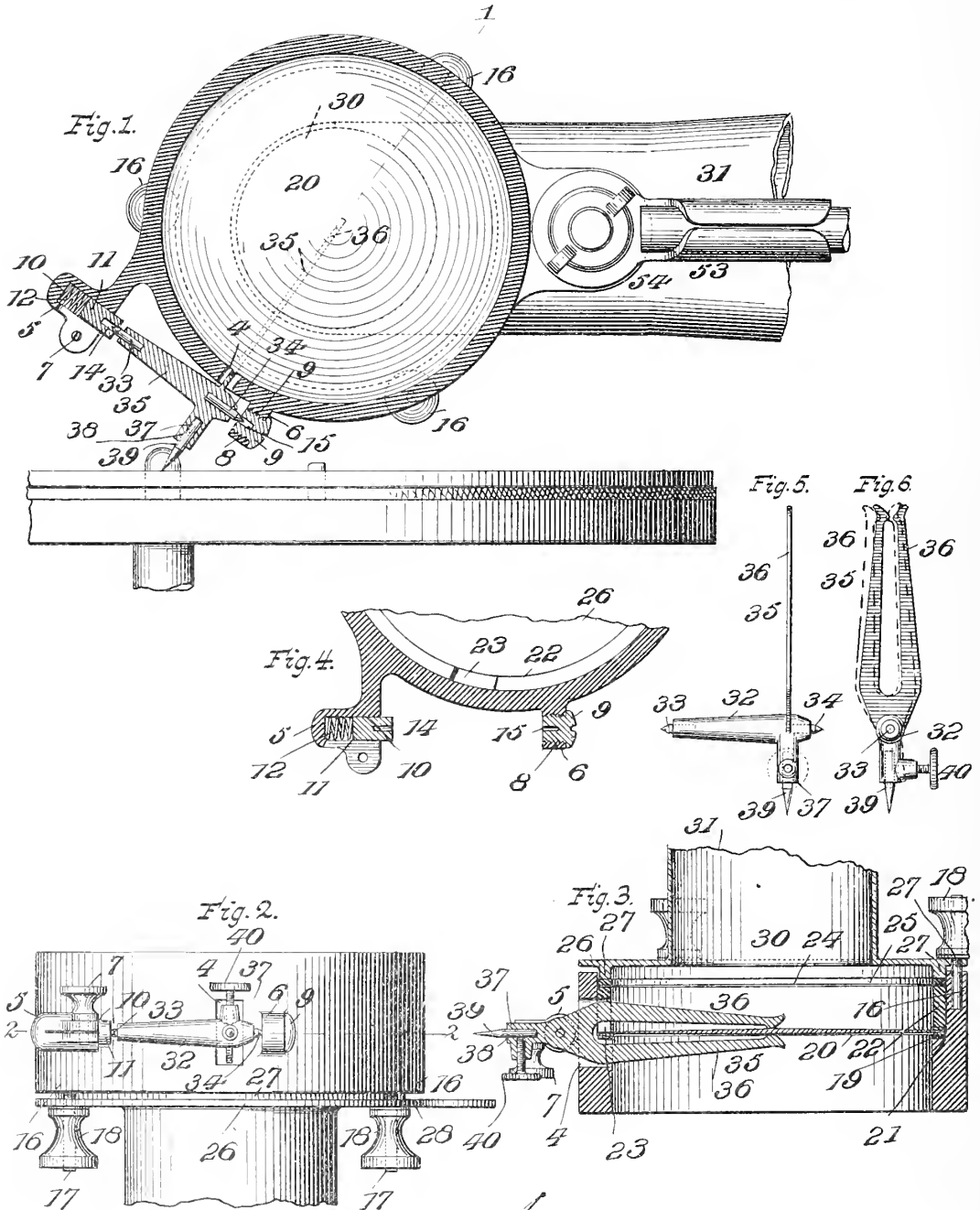
ALFRED A. ENQUIST,
S. H. NOURSE.



H. C. MILLER.
SOUND BOX.

APPLICATION FILED OCT. 29, 1904.

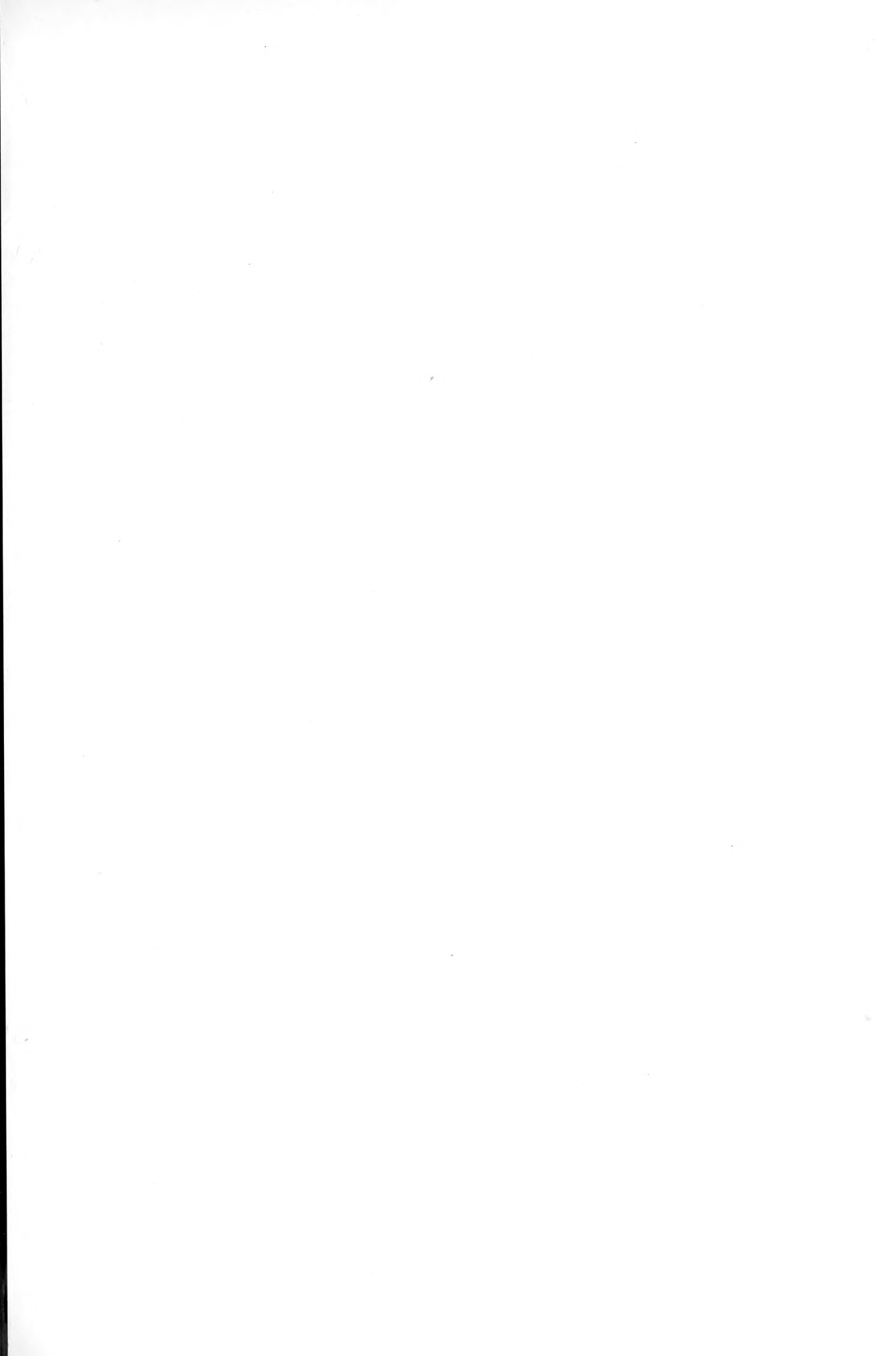
2 SHEETS—SHEET 1.



Witnesses.
G. R. Thomas
Louis H. Schmidt.



Inventor
Henry C. Miller
J. H. Miller Atty.



H. C. MILLER.
SOUND BOX.

APPLICATION FILED OCT. 29, 1904.

2 SHEETS—SHEET 2.

Fig. 12.

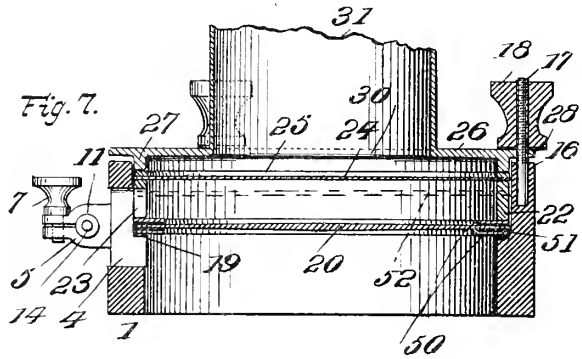
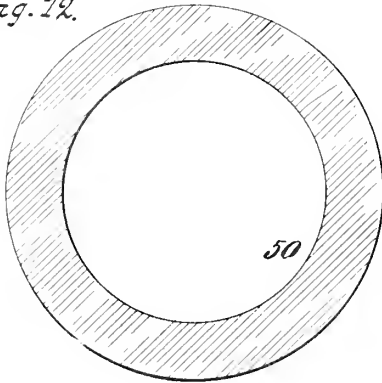


Fig. 13

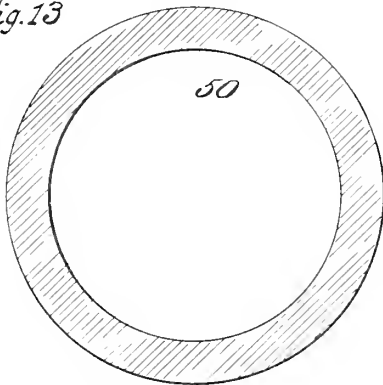


Fig. 8.

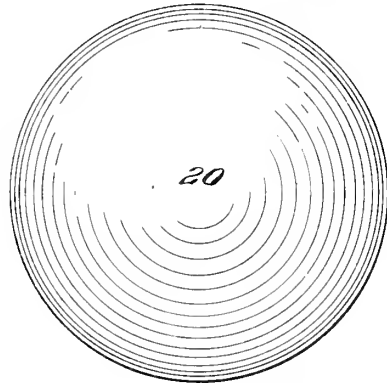


Fig. 9.



Fig. 14.

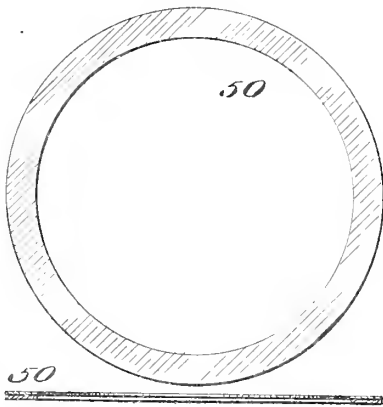


Fig. 15.

Fig. 10.

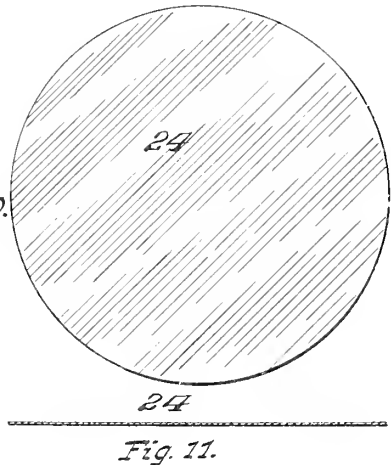


Fig. 11.

Witnesses.

G. R. Thomas
Louis H. Schmidt.

Henry C. Miller
Inventor.
J. H. Miller Atty.

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 793,012, dated June 20, 1905.

Application filed October 29, 1904. Serial No. 230,539.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, State of New York, have invented new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to improvements in sound-boxes for talking-machines.

The object of the invention is to provide a sound-box with a working and a sympathetic diaphragm, in combination with a yielding stylus mounted in bearings having means for automatically taking up wear at the bearing-points and means fixing the take-up means after it is set, the purpose of such construction being to reduce the scraping sound so prevalent with sound-boxes, as well as to give accurate inflections and articulations and regulate the sound produced.

Many other objects and advantages will be hereinafter referred to and be particularly pointed out in the claims.

In the drawings, Figure 1 is a side elevation, partially in section, of a sound-box operatively related to a talking-machine and record. Fig. 2 is an edge view of my improved sound-box. Fig. 3 is a vertical section of the same on the line 2 2, Fig. 2. Fig. 4 is a detail vertical section of the bearings for the needle-carrying bar. Fig. 5 is an edge view of the needle-carrying bar and stylus. Fig. 6 is a face view of the same. Fig. 7 is a horizontal section on the line 1 1, Fig. 1, the sounding-bar and stylus being omitted. Fig. 8 is a face view of the working diaphragm. Fig. 9 is a section of the same. Fig. 10 is a face view of a sympathetic diaphragm. Fig. 11 is a section of the same. Figs. 12, 13, and 14 are face views of various sizes of reducing-washers. Fig. 15 is a detail section of one of the washers having a rubber face. Fig. 16 is a diagrammatic view showing the vertical yielding of the stylus.

The same numerals refer to like parts in all the figures.

1 indicates a sound-box of preferred shape, open at its ends and formed with an opening 4 in its periphery. Extending radially from the periphery of the sound-box are two lugs 5 and 6, one being split and having a screw 7

and the other being threaded at 8 to receive a threaded bearing 9. The lug 5 has a barrel 10, in which works a bearing 11, and between its head and the top of the barrel is a spring 12. The opposing faces of the bearing 10 and bearing 9 are provided with seats 14 and 15, respectively. Around the outer edges of one side of the sound-box are openings 16, from which project threaded pins 17, engaged by nuts 18.

On the inside of the box and approximately opposite opening 4 is a seat 19 to receive a working diaphragm 20, the latter being preferably slightly thickened at about its center. The diaphragm 20 rests on a thin yielding, preferably rubber, washer 21 and against its opposite side bears a rubber ring 22, having a notch 23 adjacent the opening 4. A sympathetic diaphragm 24 rests on the ring 22, and against the opposite side of the diaphragm 24 is a washer 25, provided with rubber facings. A cover-plate 26, having a flange 27 and perforations 28, serves to hold the parts together. The flange 27 fits within the sound-box and against the washer 25, the perforations 28 engaging the pins 17, and the nuts 18 hold the parts together. The nuts permit the operator to regulate the compression between the cover-plate 26 and the parts within the sound-box. By tightening the nuts the vibrations of the two diaphragms may be increased or decreased. An opening 30 is formed in the cover-plate 26, and from this opening extends a sound-tube 31.

32 indicates a needle-bar provided with conical bearing-points 33 and 34, one of which fits in the opening 14 and the other fits in the opening 15. The joints formed between the points and their bearings are such that they will yield slightly under pressure, as will be explained hereinafter. Extending from the bar 32 is the stylus 35, consisting of a flat piece of yielding material forked to form two arms 36 36, the inner adjacent ends of which are contracted to firmly bear against opposite sides of the working diaphragm 20. Extending in opposite direction from the needle-bar 32 and in alinement with the center of the stylus and the working diaphragm is a

projection 37, having an opening 38 to receive a needle 39, the latter being held in place by a set-screw 40.

According to my invention it is of the utmost importance to accomplish the desired results that the needle 39 be in direct axial alinement with the working diaphragm and the sounder, inasmuch as the sound-vibrations are concentrated and focused at the center of the sound-box. That these sounds may be relieved of the harsh and unnatural sounds the stylus is mounted to yield in transit over the sound-waves of the record, and by reason of the pivotal mounting the stylus may vibrate horizontally and follow the irregular sound-waves, the working diaphragm yielding sufficiently. This movement insures all of the reproductions of the numerous horizontal irregularities of the sound-waves on the record. By positioning the stylus and its needle to yield in alinement with the sound-waves obstructions and unusual depressions in the path of the waves which now create the scraping sound do not reflect unnatural sounds and tones to the sound-box.

As seen in the diagrammatic illustration shown in Fig. 15, it will be seen that when an unusual depression or obstruction occurs in the sound-wave the stylus will yield sufficient to prevent the scraping sound being conveyed to the diaphragm. This yielding of the stylus takes up the scraping sound, and the latter is prevented from being reproduced in the sound-box. The parts of my device are so related at the joints as to allow of the stylus yielding to such a degree as will enable me to accomplish the desired results. The actual yielding movement of the stylus is extremely small; but to illustrate it clearly I have greatly exaggerated it in the diaphragm. The forks of the stylus are so adjusted that where they contact with the diaphragm they are yieldingly held thereto, so that when the stylus yields the contact with the diaphragm does not become broken or displaced. Furthermore, the specific arrangement of the mountings of the needle-bar permits the operator to take up the wear at the bearing-points to prevent the sound incident to the rattling of the parts being reflected to the sound-box. For instance, if the bearings of the needle-bar should become worn, as they frequently do, the screw 7 is released and the spring 10 forces the plug 11 toward the needle-bar with sufficient pressure to produce the best results, whereupon the screw 7 is tightened and the machine is ready for use. This adjustment is of the greatest importance, since it allows of an inexperienced operator adjusting and setting the stylus with relation to the working diaphragm and at the same time the yielding tendency of the stylus is not interfered with.

Those familiar with sound-boxes are fully acquainted with the unnatural and harsh sounds produced when a single diaphragm is used, and I have found that this objectionable feature can be readily overcome by gathering and reflecting the sounds to a sympathetic diaphragm. It is therefore the purpose of the diaphragm 24 to receive the sounds reflected from the diaphragm 20, and as it is unobstructed by contact at its center the sounds are gathered and neutralized, which results in the emitting of a blended harmonious reproduction of the sound-waves in the horn. The diaphragm 24 acts as a relay and intensifies the sound produced by the diaphragm 20, resulting in a rich, sweet, and natural reproduction. Should a record be used which has a low pitch and yet the speed of the machine be approximately right and it is desired to increase the pitch in certain or both sides of the working diaphragm 20, a pair of washers 50 will be placed adjacent the said diaphragm, as shown in Fig. 7. These washers have yielding surfaces 51 and are used in pairs of the same size and are furnished in sets ranging preferably from the size shown in Fig. 12 to that shown in Fig. 14. Obviously if a pair of washers (shown in Fig. 12) be placed each side of the diaphragm 20 the pitch of the sound will be greatly increased, whereas if a low pitch be required the washer having the smaller surface (shown in Fig. 14) would be used.

In applying the various washers to produce the best natural sound and effects the cover 26 is removed and the parts are separated and the desired pair of washers are inserted, and by increasing or decreasing the tension of the nuts 18 the sound is regulated to suit the "ear" of the hearer. The mounting of the needle-bar readily permits of its proper adjustment when the washers are used.

The sympathetic diaphragm being housed intermediate the opening of the sound-tube and the working diaphragm, the blended and harmonious sounds are carried to the horn and distributed.

As shown in dotted lines at 52 in Fig. 7, a series of sympathetic diaphragms may be employed, if desired, one reflecting and blending the sound from the other.

For convenience the sound-box is applied to the arm 53 of the talking-machine by a set-screw 54.

In changing the washers to suit the varying circumstances it is obvious that the use of tools to gain access to the sound-box is entirely dispensed with, as it is only necessary to release the cover and fit the washers and then adjust the nuts accordingly.

What I claim as new is—

1. A sound-box comprising a casing formed with an opening, a working dia-

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phragm, a sympathetic diaphragm spaced from the working diaphragm, the opening in the casing communicating with the space formed between the two diaphragms, and a stylus-lever passing through the opening and contacting with the working diaphragm.

2. A sound-box comprising a casing, a diaphragm, a stylus-lever in contact with the diaphragm, trunnions projecting from the stylus-lever, a fixed bearing to receive one of the trunnions, a movable bearing having means to normally force it toward the other trunnion, and means for fastening the movable bearing after it has been set.

3. A sound-box comprising a casing, a diaphragm, a flat spring-stylus lever which yields in two right-angular directions, the stylus-lever being in contact with the diaphragm, and adapted to move at right angles thereto under the influence of a sound-record independently of said two yielding movements.

4. A sound-box comprising a casing, a diaphragm and a fork-shaped stylus-lever, the forks of which yield toward or from each other and embrace and contact with opposite sides of the diaphragm, and means supporting the stylus-lever in relation to the diaphragm.

5. A sound-box comprising a casing, a diaphragm, a yielding fork-shaped stylus-lever which yields in two right-angular directions, the forks of the stylus-lever embracing and contacting with opposite sides of the diaphragm, and means supporting the stylus-lever in relation to the diaphragm.

6. A sound-box comprising a casing, a working diaphragm, a sympathetic diaphragm spaced from the working diaphragm, a fork-shaped stylus-lever, the forks of which yield toward or from each other and embrace and contact with opposite sides of the working diaphragm, one of the forks passing through the opening in the casing and into the space between the two diaphragms, and means supporting the stylus-lever in relation to the diaphragm.

7. A sound-box comprising a casing, a diaphragm, a stylus-lever having opposite bearing-points, a slidable bearing which receives one of the bearing-points, means tending to force the slidable bearing toward the stylus-lever, and means for holding the slidable bearing in fixed position after the forcing means force it out.

8. A sound-box comprising a casing, a diaphragm, a stylus-lever which yields toward or from the plane of travel, bearings at opposite points to support the stylus-lever, spring-actuated means for taking up wear at the bearing-points, and means for holding said means after it has been set.

9. A sound-box comprising a casing, a diaphragm, a fork-shaped stylus-lever which

yields toward or from the plane of travel, the forks yielding toward or from each other, bearings at opposite points to support the stylus-lever, spring-actuated means forcing the bearings closer together, and means holding the forcing means after being set.

10. A sound-box comprising a casing, a diaphragm, a yielding horizontally-pivoted stylus-lever yieldingly contacting with the diaphragm, means under pressure for taking up wear at the pivotal points of the stylus-lever, and means fastening the take-up means after it has been set.

11. A sound-box comprising a casing, a diaphragm, a stylus-lever in contact with the diaphragm, trunnions projecting from the stylus-lever, bearings which receive the trunnions, means normally exerting pressure in line with the trunnions to decrease the distance between the bearings, and means retaining the fixed distance between the bearings after having been set.

12. A sound-box comprising a casing, a cover-plate formed with an opening for the exit of sound, a working diaphragm, a pivotally-mounted stylus-lever in touch with the working diaphragm, a sympathetic diaphragm, means adapted to be interposed in the sound-box to increase or decrease the pitch of sound, means under pressure bearing against one of the pivots of the stylus-lever to take up wear, and means for fastening the take-up means after it has been set.

13. A sound-box comprising a casing, a diaphragm, a seat therefor, a washer surrounding each side of the outer edge of the diaphragm, each washer extending beyond the seat toward the center of the diaphragm, means holding the washers and diaphragm in position, and a stylus-lever contacting with the diaphragm.

14. A sound-box comprising a casing, a diaphragm, a stylus-lever contacting with the diaphragm, a needle-bar with which the stylus-lever is connected, a trunnion at each end of the needle-bar, bearings for the trunnions, one of said bearings being spring-actuated, and means holding the spring-actuated bearing after it is set.

15. A sound-box comprising a casing, a diaphragm, a stylus-lever, bearings at opposite points to support the stylus, one of said bearings being spring-actuated, means holding the spring-bearing after it has been set, and a needle-holder in line with the center of the stylus-lever.

16. A sound-box comprising a casing, a diaphragm, a stylus-lever which is forked at one end and has formed on its forks contact-points which yieldingly engage the center of the diaphragm, a needle-bar from which the stylus-lever projects, a needle-holder projecting from the needle-bar, the center of said needle-bar being in line with the center

between the stylus-lever contact-points, and means for taking up wear of the needle-holder.

17. A sound-box comprising a casing, a working diaphragm, a seat for the diaphragm, a pivotally-mounted yielding forked stylus-lever having contacts on adjacent faces of the forks, and two washers, one of said washers being placed on each side of the diaphragm and extending beyond the seat therefor.

18. A sound-box comprising a casing, a diaphragm, a fork-shaped stylus-lever, the forks of the stylus-lever yieldingly engaging opposite sides of the diaphragm, and a needle-holder attached to the stylus-lever.

19. A sound-box comprising a casing, a working diaphragm, a seat therefor, a washer surrounding each side of the outer edge of the working diaphragm, each washer extending beyond the seat and toward the center of the working diaphragm, a sympathetic dia-

phragm spaced from the working diaphragm and a stylus-lever contacting with the working diaphragm.

20. In combination, a sound-box, a stylus-lever, means adjusting the stylus-lever to take up wear at the supporting-points, and means fastening the adjusting means after it has been adjusted.

21. In combination, a sound-box, a stylus-lever, bearings projecting from the sound-box to support the stylus-lever, one of said bearings being split and carrying an adjusting means which acts on the bearing of the stylus-lever, and means for tightening the split bearing after the adjusting means has been set.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:

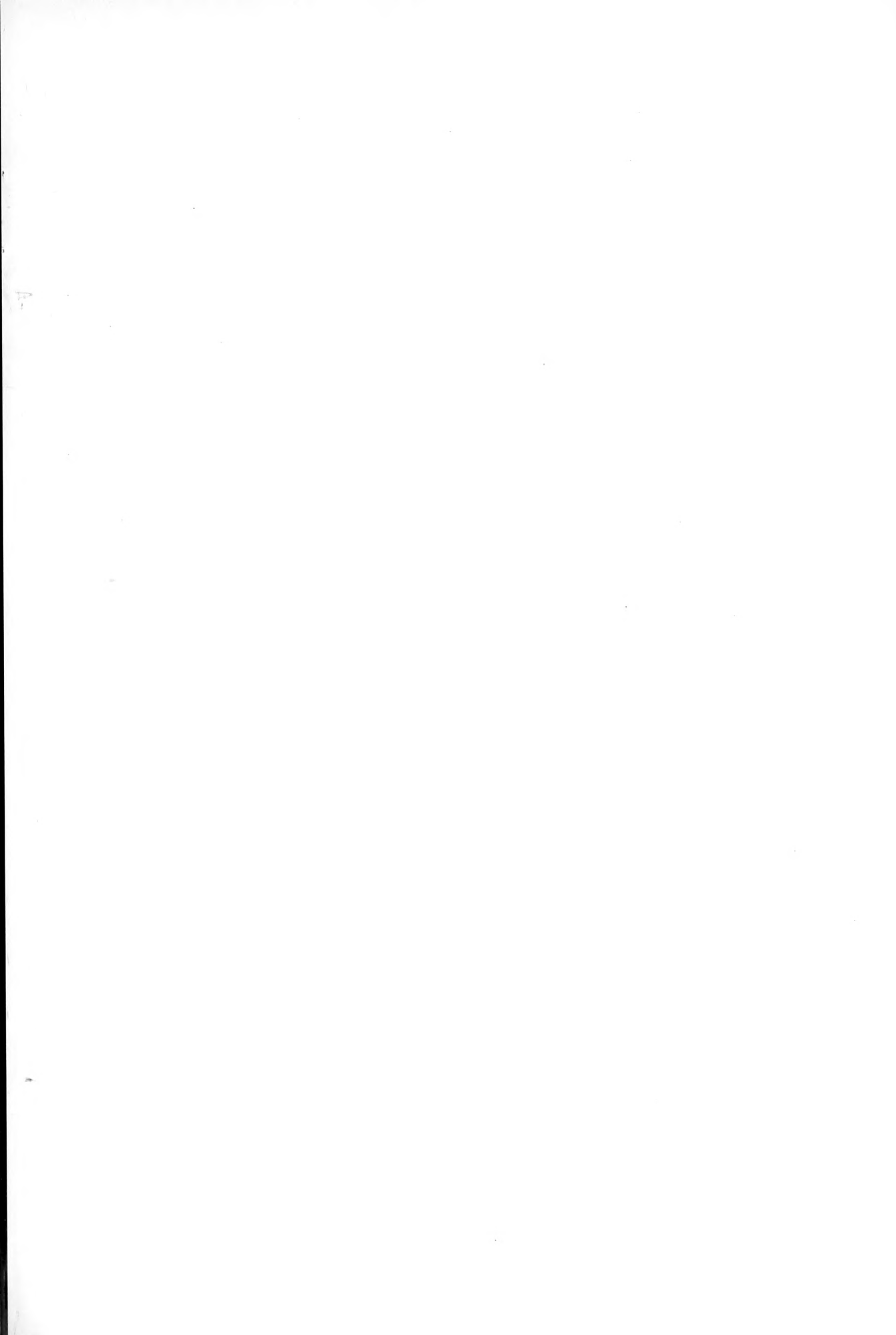
WM. F. PALMER,

FRANCIS A. MARTIN.

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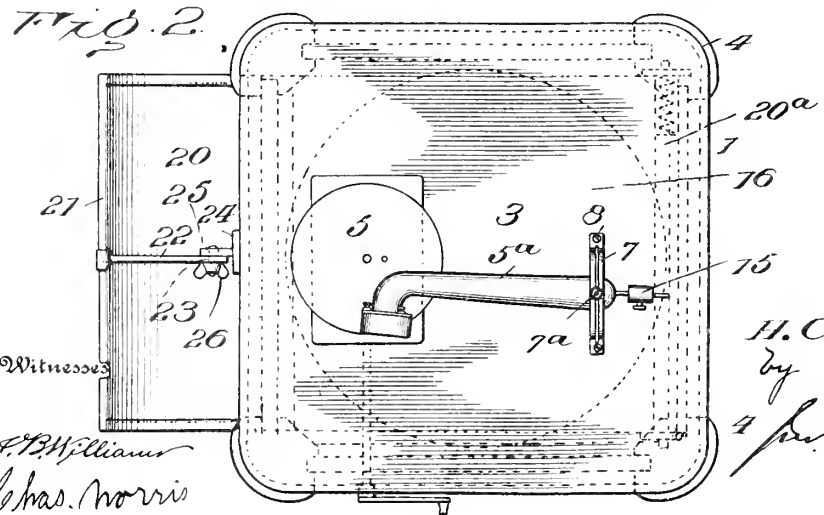
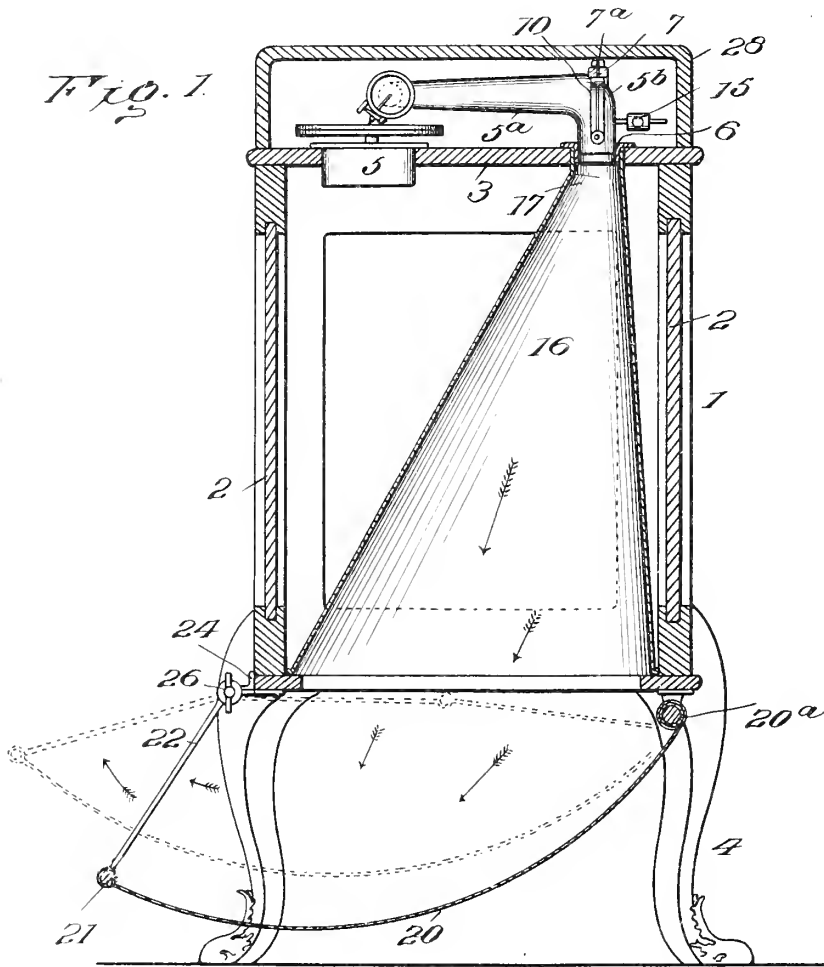
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H. C. MILLER.
COMBINED STAND AND HORN FOR TALKING MACHINES.

APPLICATION FILED DEC. 6, 1904.

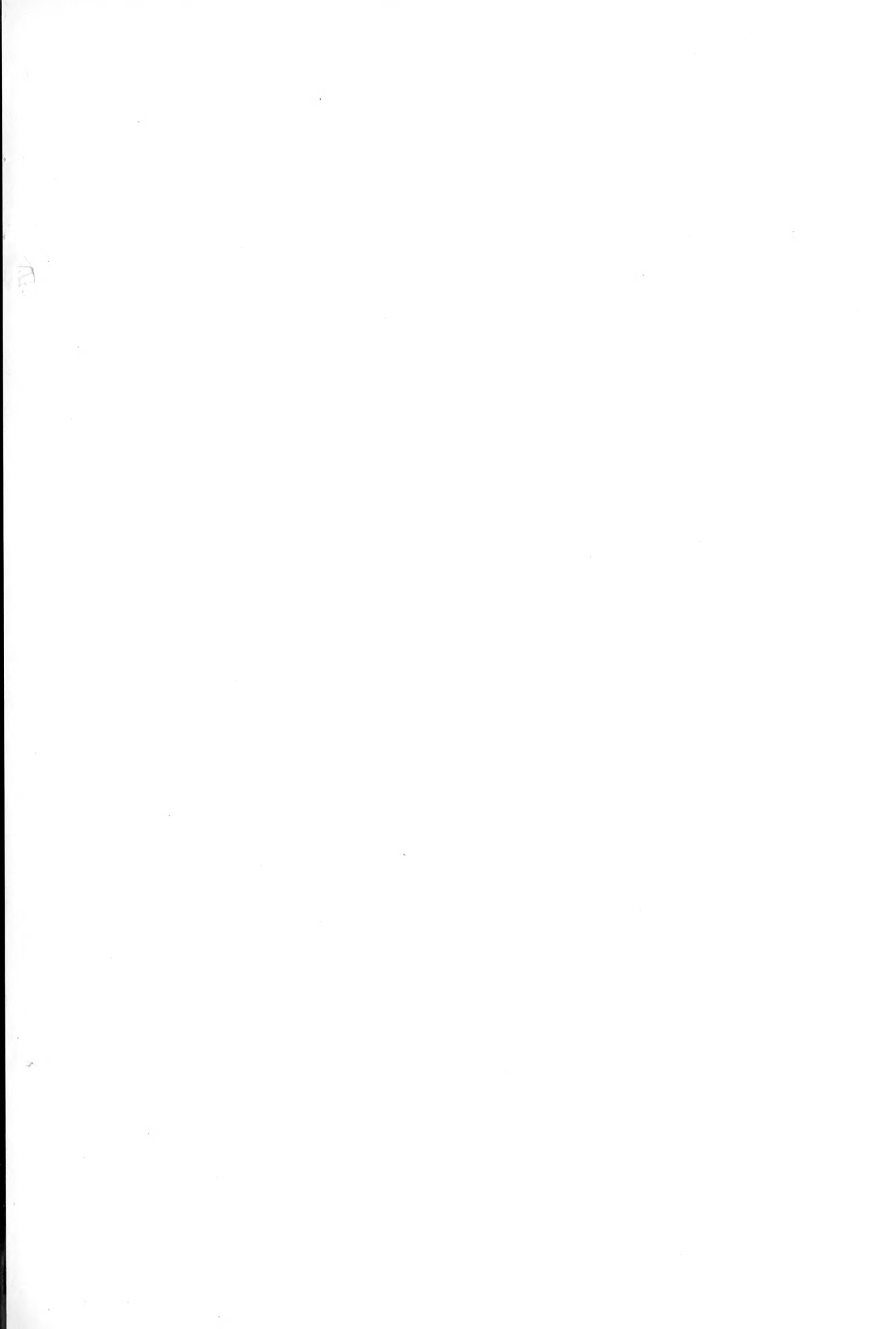
3 SHEETS—SHEET 1.



Witnesses

A. B. Williams
Charles Norris

Inventor
H. C. Miller
by
J. P. Miller
Attorney



H. C. MILLER.

COMBINED STAND AND HORN FOR TALKING MACHINES.

APPLICATION FILED DEC. 6, 1904.

3 SHEETS—SHEET 2.

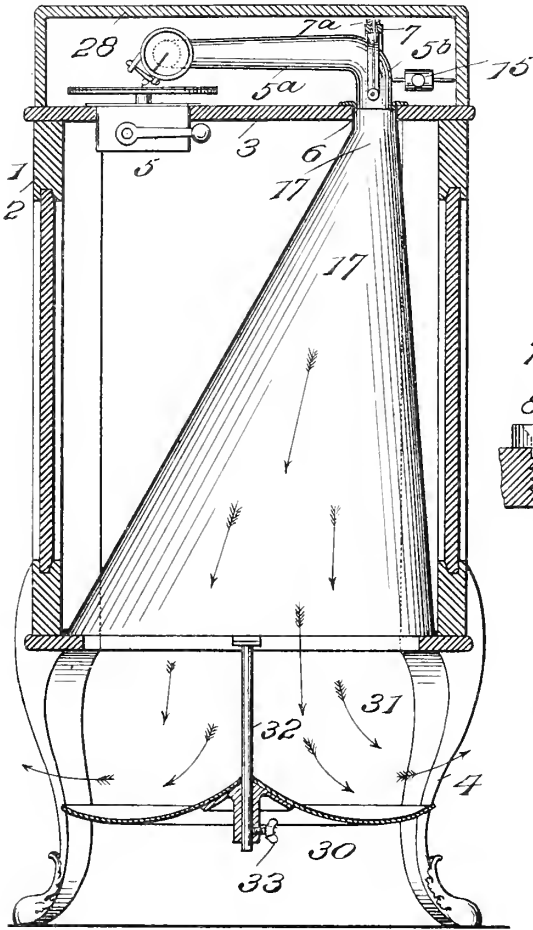


Fig. 4.

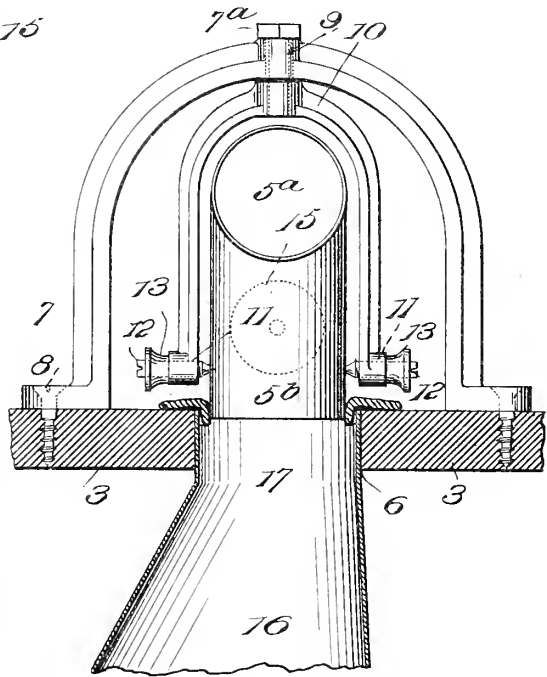


Fig. 3.

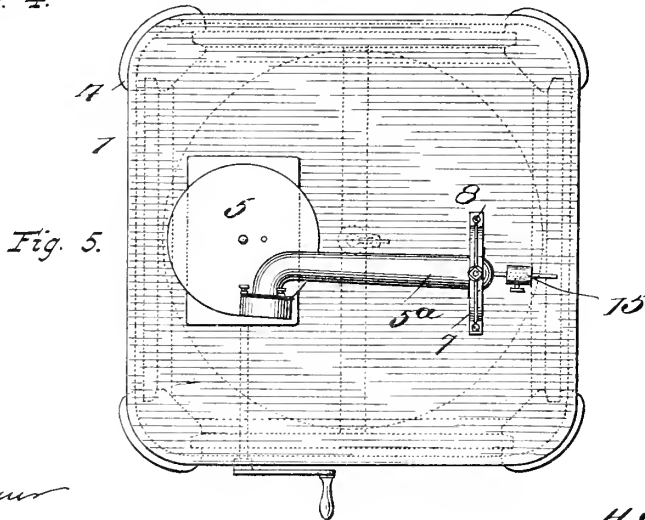


Fig. 5.

Witnesses.

A. B. Williams

Lehas Morris

Inventor.

H. C. Miller

Substantive Atty



H. C. MILLER.
COMBINED STAND AND HORN FOR TALKING MACHINES.
APPLICATION FILED DEC. 6, 1904.

3 SHEETS—SHEET 3.

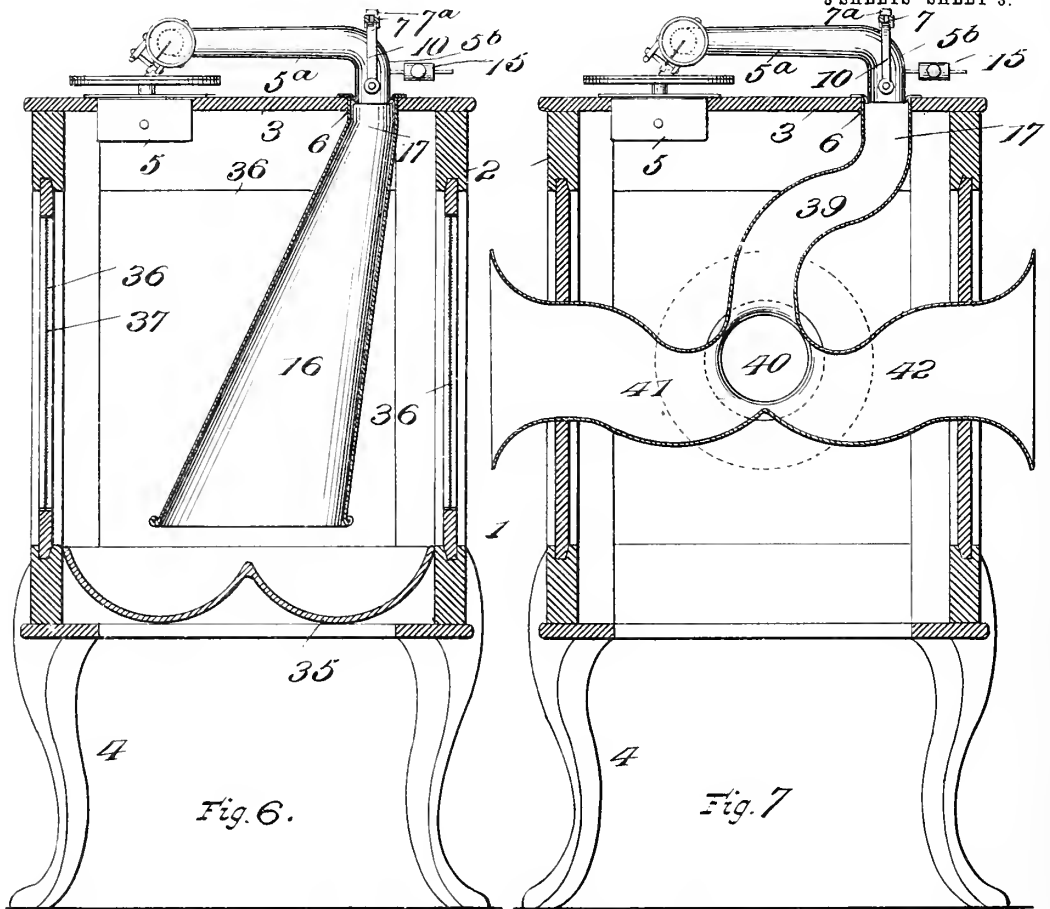


Fig. 6.

Fig. 7.

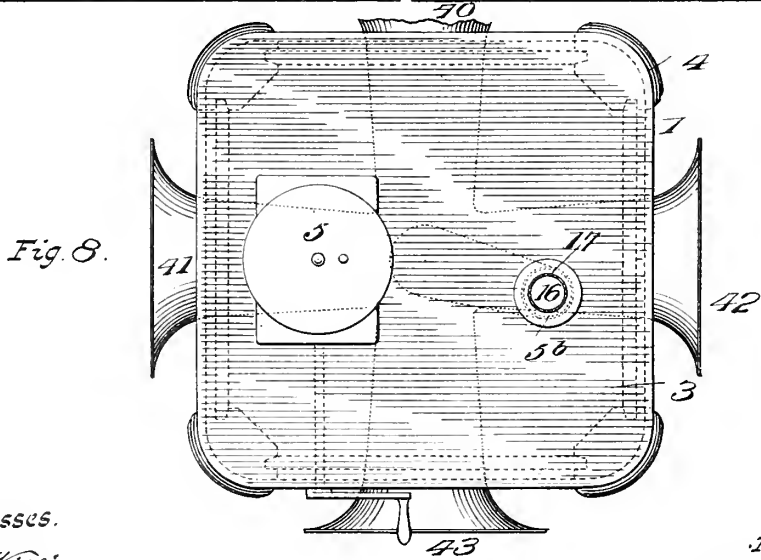


Fig. 8.

Witnesses.
A. B. Williams
Chas. Norris

Inventor.
H. C. Miller
 by
J. J. Miller Atty.

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

COMBINED STAND AND HORN FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 793,013, dated June 20, 1905.

Application filed December 6, 1904. Serial No. 235,722.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented new and useful Improvements in a Combined Stand and Horn for Talking-Machines, of which the following is a specification.

This invention relates to improvements in a combined stand and horn for a talking-machine.

Talking-machines now in use employ a horn extending out from the sound-box, which is large, unsightly, and frequently takes up so much room that it is in the way. I have found that it is not essential to extend the horn from the machine and have therefore constructed a cabinet on which the talking-machine is placed and utilize the interior of the cabinet to accommodate a horn and a deflector to distribute the sound. The object of combining these two elements is to economize space and at the same time provide means for utilizing a large horn without projecting it out from the talking-machine, as practiced with machines of this type now in use.

A further object of this invention is to provide a stationary horn in a cabinet with an adjustable exit that the sound may be directed to an audience at any angle.

Other objects and advantages will be hereinafter referred to and be particularly pointed out in the claims.

In the drawings, Figure 1 is a sectional view of the preferred form of my invention. Fig. 2 is a top plan view with the cover removed. Fig. 3 is a detail transverse vertical section of the means employed for supporting the pipe leading from the talking-machine to the horn and the connection between the pipe and horn. Fig. 4 is a vertical sectional view of a modified form of my invention. Fig. 5 is a plan view of the same. Fig. 6 is a vertical section of a different modification. Fig. 7 is a similar view of a further modification. Fig. 8 is a plan view of the modification shown in Fig. 7.

The numeral 1 indicates a cabinet composed of sides 2, top or support 3, and legs 4. The top 3 is cut out to receive a talking-machine

5, which may be of any well-known type, and connected to the sound-box is a tube 5^a, having the outer end 5^b turned down. An opening 6 is formed in the top 3 opposite the talking-machine, and straddling the opening is a yoke 7, fastened in place by screws 8, and provided at about its center with a vertical opening 9, the center of said opening being coincident with the center of the opening 6. A smaller yoke 10 is swiveled to the yoke 7 by a bolt 7^a passing through the opening 9, and at the terminals of the yoke 10 are alined openings 11 11 to receive pointed screws 12 12, which receive lock-nuts 13 13. The points of the screws 12 bind the turned-down end 5^b of the tube 5^a to fasten the latter to the yoke 10. This construction permits the tube to turn horizontally, the screw 7^a being the pivotal connection. A weight 15 is mounted on a rod extending from the tube to counterbalance the tube and the sound-box.

16 indicates a horn made conical, its smaller end 17 fitting in the opening 6 and its larger end or mouth extending to the bottom of the cabinet 1. A suitable packing is interposed between the turned-down end 5^b of the tube 5^a and the upper end 17 of the horn. Obviously the purpose of the packing is to prevent the escape of sound at this point.

Connected to the bottom of the cabinet and communicating with the horn is arranged an adjustable flexible sound-deflector 20. The deflector may be secured to the bottom of the cabinet in any suitable manner, but preferably by a spring-roller 20^a, and at its front end is a bar 21, having connected to it an arm 22, provided with an opening 23. Adjacent the arm is a bracket 24, fastened to the cabinet and formed with an opening 25. A set-screw 26 passes through the openings 23 and 25 to set the mouth of the deflector at a convenient angle. By making the deflector of flexible material it can be rendered adjustable without the necessity of making joints, &c., which would retard the sound-waves.

The spring-roller 20^a is of the usual type and can be used to roll the deflector under the cabinet when not in use.

While I have described one form of means for holding the deflector after it has been ad-

justed, I desire it to be distinctly understood that it is in no wise intended as a limitation.

28 indicates a cover hinged to the cabinet to shield the talking-machine.

5 In operation the talking-machine is started and the sound passes through the tube 5^a to the horn 16, thence to the deflector, and out to the atmosphere. The sound striking the deflector is thrown out into the atmosphere
10 in a soft blended tone. The "brassy" sound so prevalent with talking-machine horns is almost entirely removed.

By swiveling the tube at one end, as described, the end of said tube and the horn are
15 always retained in alinement.

In the modification shown in Figs. 4 and 5 the horn 16 and its connection with the talking-machine are the same as in Figs. 1 to 3; but the deflector is made in the form of a concavo-convex disk 30, and a space 31 is formed
20 between the bottom of the horn and the disk for the exit of sound. The disk is formed with a central hole which relieves a standard 32, depending from the bottom of the cabinet, the disk being secured to the standard by
25 a set-screw 33, so that the volume of sound emitted through the space 31 can be quickly and conveniently controlled.

In the form of my invention shown in Fig.
30 6 a concavo-convex disk 35 is located inside the cabinet 1, and the sound passes to the atmosphere through opening 36, covered with net or fine gauze 37. In many instances this construction gives decidedly satisfactory results; but by reason of it not having an adjustable deflector the sound cannot be regulated.

From the foregoing it will be seen that I have provided a simple and neat stand for a
40 talking-machine and have also arranged a convenient means for accommodating the horn. Such a construction, as before stated, absolutely removes the unsightly and awkward appearance of the horn extending from
45 the talking-machine. Furthermore, by providing the adjustable deflector the range, tone, and volume of sound is under perfect control of the operator.

In Figs. 7 and 8 I have provided the horn
50 39 with four branches 40, 41, 42, and 43, a branch passing through an opening in each side of the cabinet and forming a deflector. The area of the branch tubes about equals the area of one of the big horns shown in Fig. 1,
55 so that the sound produced is equal in volume to the preferred form.

What I claim as new is—

1. In combination, a casing having a support for a talking-machine, legs supporting
60 the casing and forming a space at the bottom of the casing, a horn extending downwardly below the support and terminating to discharge sound in the space, and a deflector at the bottom of the horn, the horn being enclosed by the casing.
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2. In combination, a casing having a support for a talking-machine, a horn extending downwardly below the support, a deflector at the bottom of the horn, the horn being enclosed by the casing, a tube adapted to communicate with the talking-machine and the
70 upper end of the horn, and a swiveled connection at the end of the tube which communicates with the horn, said connection comprising a stationary standard, a yoke connected
75 to the tube and swiveled to the standard.

3. In combination, a casing having a support for a talking-machine, legs supporting the casing and forming a space at the bottom of the latter, a horn extending downwardly
80 below the support and terminating to discharge sound in the space, and a deflector at the bottom of the horn and mounted in the space, a tube adapted to communicate with a talking-machine, the tube and horn being enclosed in the casing.
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4. In combination, a casing having a support for a talking-machine, a horn inclosed by the casing, and a flexible deflector at the mouth of the horn.
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5. In combination, a casing having a support for a talking-machine, a horn inclosed by the casing, a flexible deflector at the mouth of the horn, and means for adjusting the deflector.
95

6. In combination, a casing having a support for a talking-machine and a space formed below the casing, a horn inclosed by the casing and extending downwardly to the bottom of the casing, and an adjustably-mounted deflector in the space and adjacent the mouth of the horn.
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7. In combination, a casing having a talking-machine support, a cover over the support to form a separate compartment for the
105 talking-machine, a horn depending from the support, a tube above the support and adapted to communicate with a talking-machine and the horn, the horn being inclosed within the casing below the support, and a deflector at
110 the mouth of the horn.

8. In combination, a casing, a support in the casing, a horn projecting through an opening in the support, a tube communicating with a talking-machine and the horn, a hanger, a
115 yoke secured to the tube, and swiveled connection between the yoke and hanger, the horn being inclosed in the casing.

9. In combination, a casing, a support for a talking-machine, a horn within the casing, and extending downwardly toward the bottom of the same, a flexible deflector at the bottom of the casing and communicating with the mouth of the horn, and means for adjusting the mouth of the deflector.
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10. In combination, a stand for a talking-machine, a horn within the stand, a flexible deflector adjacent the exit of the horn, and means for folding the deflector when not in use.
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11. In combination, a stand for a talking-

machine, a horn inclosed within the stand, a flexible deflector at the mouth of the horn, means holding the deflector open, and means for folding the deflector when not in use.

5 12. In combination, a stand for a talking-machine, a horn inclosed within the stand with its mouth at the bottom of the latter, a flexible deflector under the stand and opposite the mouth of the horn, means holding the deflec-

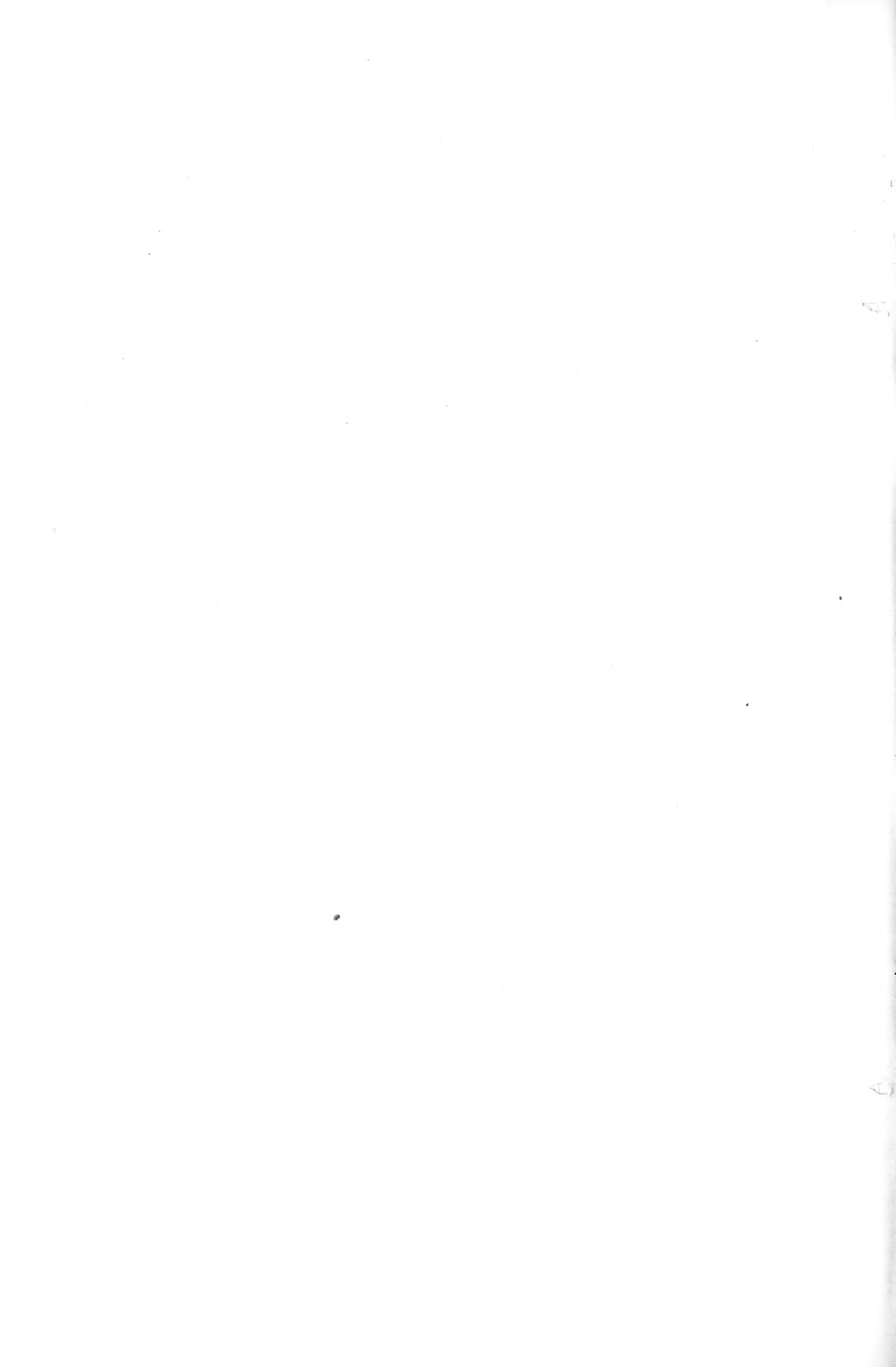
tor open, and spring-actuated means for fold- 10
ing the deflector under the stand.

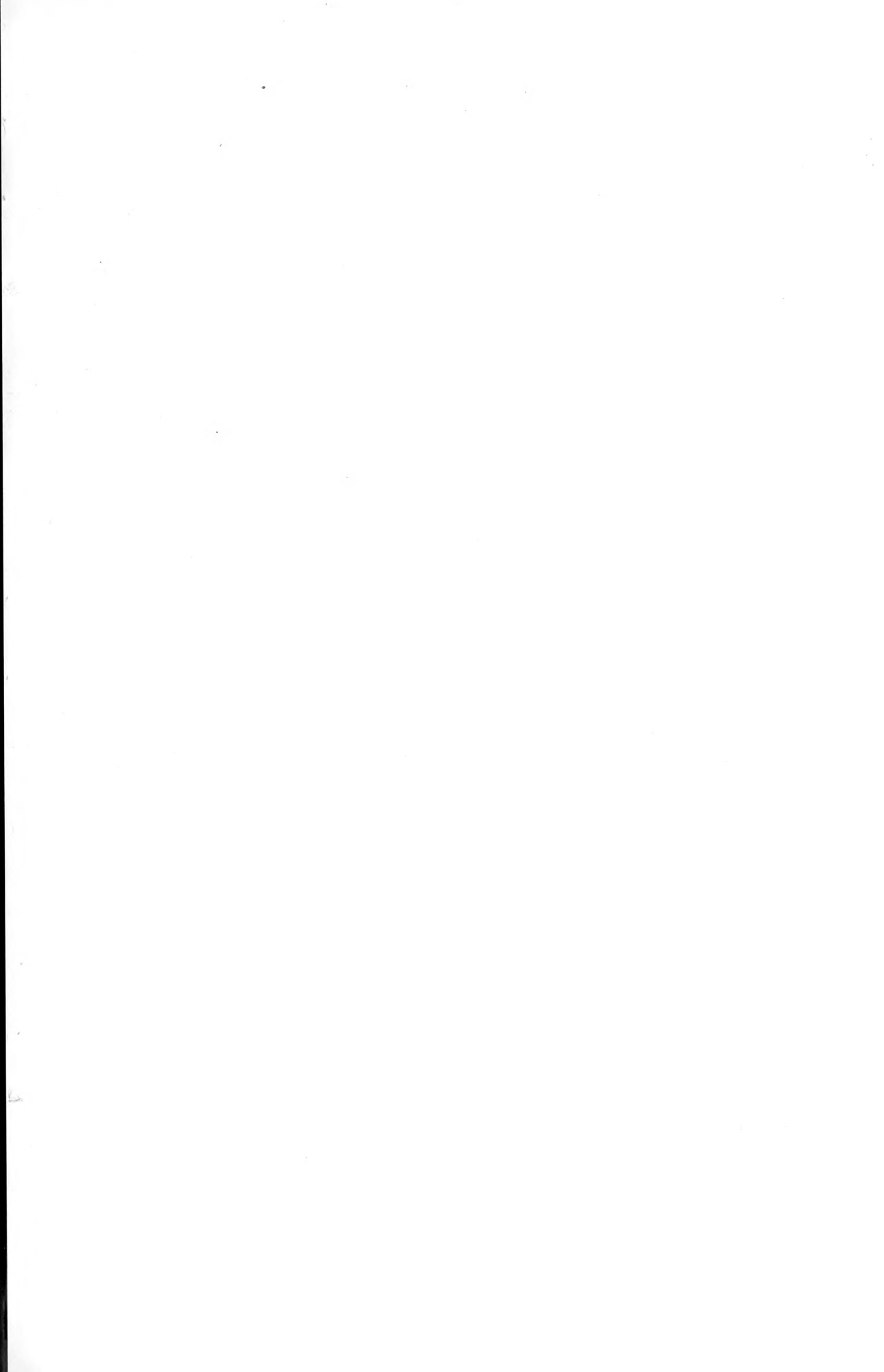
In testimony whereof I affix my signature in presence of two subscribing witnesses.

HENRY C. MILLER.

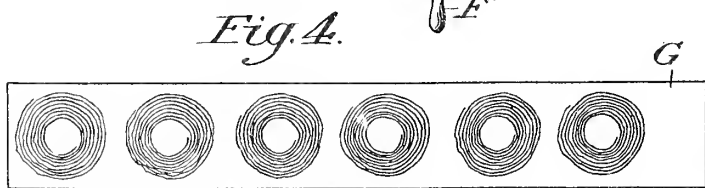
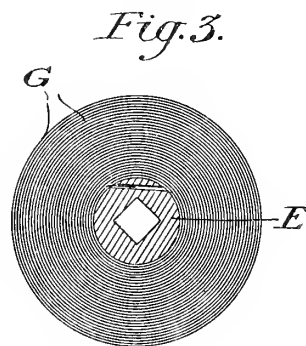
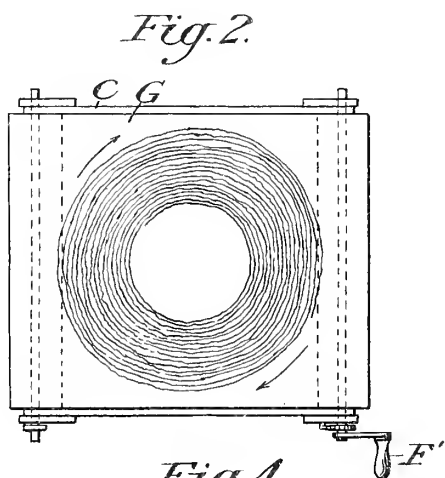
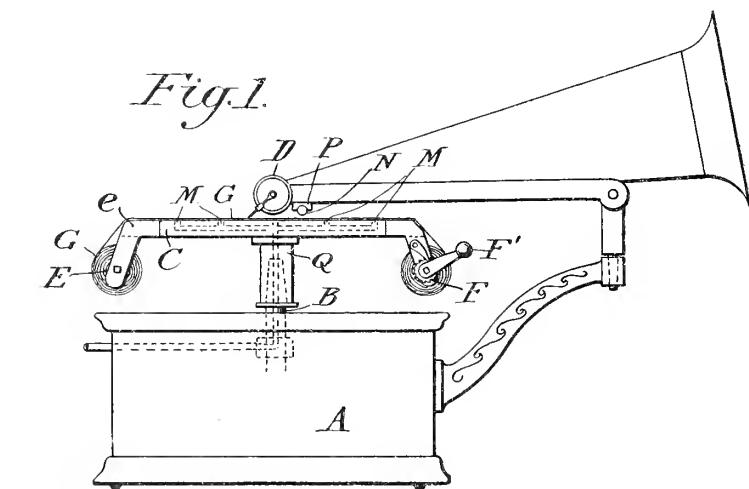
Witnesses:

WM. F. PALMER,
ALONZO KNAPPEN.





G. A. MANWARING.
TALKING MACHINE.
APPLICATION FILED JAN. 12, 1904.



Witnesses:

Gustave R. Thompson.

Wm. B. Herkum.

Inventor:

George A. Manwaring,

by
Nauro. Cameron, Lewis Massie,
attys.

UNITED STATES PATENT OFFICE.

GEORGE ABBOTT MANWARING, OF BAYONNE, NEW JERSEY, ASSIGNOR
TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DIS-
TRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 793,140, dated June 27, 1905.

Application filed January 12, 1904. Serial No. 188,796.

To all whom it may concern:

Be it known that I, GEORGE ABBOTT MANWARING, of Bayonne, county of Hudson, State of New Jersey, have invented a new and useful Improvement in Talking-Machines, which invention is fully set forth in the following specification.

By my invention I provide for continuous sound-records and practically continuous re-
10 productions of the same, the length of any record depending, of course, upon the amount that can be placed upon the available surface of the record-tablet. Heretofore, in practice at least, this has been limited to sounds that
15 would occupy but about five minutes or generally less time. By my invention I am enabled in a convenient manner to make records practically continuous through hours.

The invention consists in providing a mag-
20 azine carrying the record-receiving material, successive portions of which are presented to the action of the recorder intermittently as each previous portion has been filled with a record. The most convenient form consists
25 of a record-receiving strip of flexible material wound upon a drum or roller, and preferably this drum is carried by a revolving support that passes under the recorder. The support
30 in question may be either cylindrical or of other shape; but for clearness I will describe a flat turn-table.

In the drawings, Figure 1 is a side view of one form of my invention. Fig. 2 is a plan of the same, the sound-box being removed.
35 Fig. 3 is a sectional view of the roller containing a strip of the record-receiving material; and Fig. 4 is a portion of such strip, on a reduced scale, showing a succession of spiral records.

40 A is a motor of any convenient form, such as now used for disk graphophones.

B is the vertical shaft rotated by the motor, and C is a turn-table carried thereby and shown in Fig. 2 as rectangular. This turn-
45 table is rotated in operative relation with any suitable sound-box D that is fed radially across the table in any well-known manner.

E represents a drum, carried by depending

brackets *e* beneath one edge of the turn-table C, and F is a similar drum supported in the
50 same manner beneath the opposite edge of the table. These drums may be provided with a pawl and ratchet to prevent their traveling backward. One of the drums, as F, is provided with a handle F'. Wrapped on the
55 drum E is a roll of flexible recording material G, which is carried across the upper surface of the table C and connected to the drum F.

When the machine is operated, the turn-
60 table revolves, carrying with it the magazine E and the exposed portion of the recording material G; the sound-box is gradually fed (radially) across the material G, preferably by means of a thread revolving shaft N and the half-nut P, and produces a sound-record
65 thereon. When the recording-tool has reached its limit of effective movement inward to the center of the table C, it is lifted upward to disengage from the recording material G and
70 (by means of the handle F' or otherwise) the record already made is rolled around the drum F, and the succeeding portion of the recording material G is exposed upon the top of the turn-table, whereupon the sound-box and its
75 stylus are moved back to the outer edge of the table and a second spiral record is commenced. This procedure may be carried on as long as desired or until the entire roll of flexible recording material G has been ex-
80 hausted.

It will sometimes happen from one cause or another that the recording-surface G will not lie perfectly flat or smooth upon the turn-
85 table C. I may obviate this by the following device: M M represents a series of orifices in the upper face of the turn-table C, uniting with a common duct Q, which in turn is connected with some device (a fan or the like) for securing a partial vacuum. The result is a suction
90 exerted at these orifices M M which holds the exposed portion of the flexible recording material G flat and smooth upon the turn-table.

In practice a practically continuous dictation may be recorded in successive spirals upon a strip of flexible recording material which
95 may be as long as convenient. Again, when

a particular record has been completed the portion of the strip containing it may be torn off and applied to a reproducing-machine or filed away for future reference. In reproducing the strip is arranged on a similar machine, care being taken to center each spiral upon the turn-table and a reproducing sound-box being used in place of a recording device.

Modifications of my invention will at once suggest themselves, and parts of the invention may be used to the exclusion of other parts without in any way departing from the spirit of my invention.

Having thus described my invention, I claim—

1. The combination of a revolving support in operative relation with a recording or reproducing device, a magazine traveling therewith and carrying a flexible recording material continuous portions of which are successively and intermittently exposed upon said table to the action of said recording or reproducing device.

2. The combination of a revolving support in operative relation with a recording or reproducing device, a magazine traveling therewith carrying a flexible recording material continuous portions of which are successively and intermittently exposed upon said support to the action of said recording or reproducing device, and suitable means for holding said flexible recording material smoothly upon said support.

3. The combination of a revolving support, a magazine traveling in fixed relation thereto, a recording material carried by said magazine and having a portion thereof extending over said support, and means for successively presenting at intervals different continuous portions of said material upon said support.

4. The combination of a revolving support in operative relation with a recording or reproducing device, and a magazine traveling therewith carrying a continuous sound-recording material.

5. A turn-table carrying two oppositely-disposed rollers for presenting successive portions of a continuous sound-recording material.

6. A turn-table carrying two oppositely-disposed rollers for presenting successive portions of a continuous sound-recording material and means for intermittently substituting such successive portions.

7. The combination of a revolving support in operative relation with a recording or reproducing device, a magazine traveling therewith and carrying a flexible recording material in the form of a strip, and means for intermittently presenting successive continuous portions of said strip to the action of the recording or reproducing device, the revolution of said support serving to present the exposed surface of said recording material to the usual action of said device.

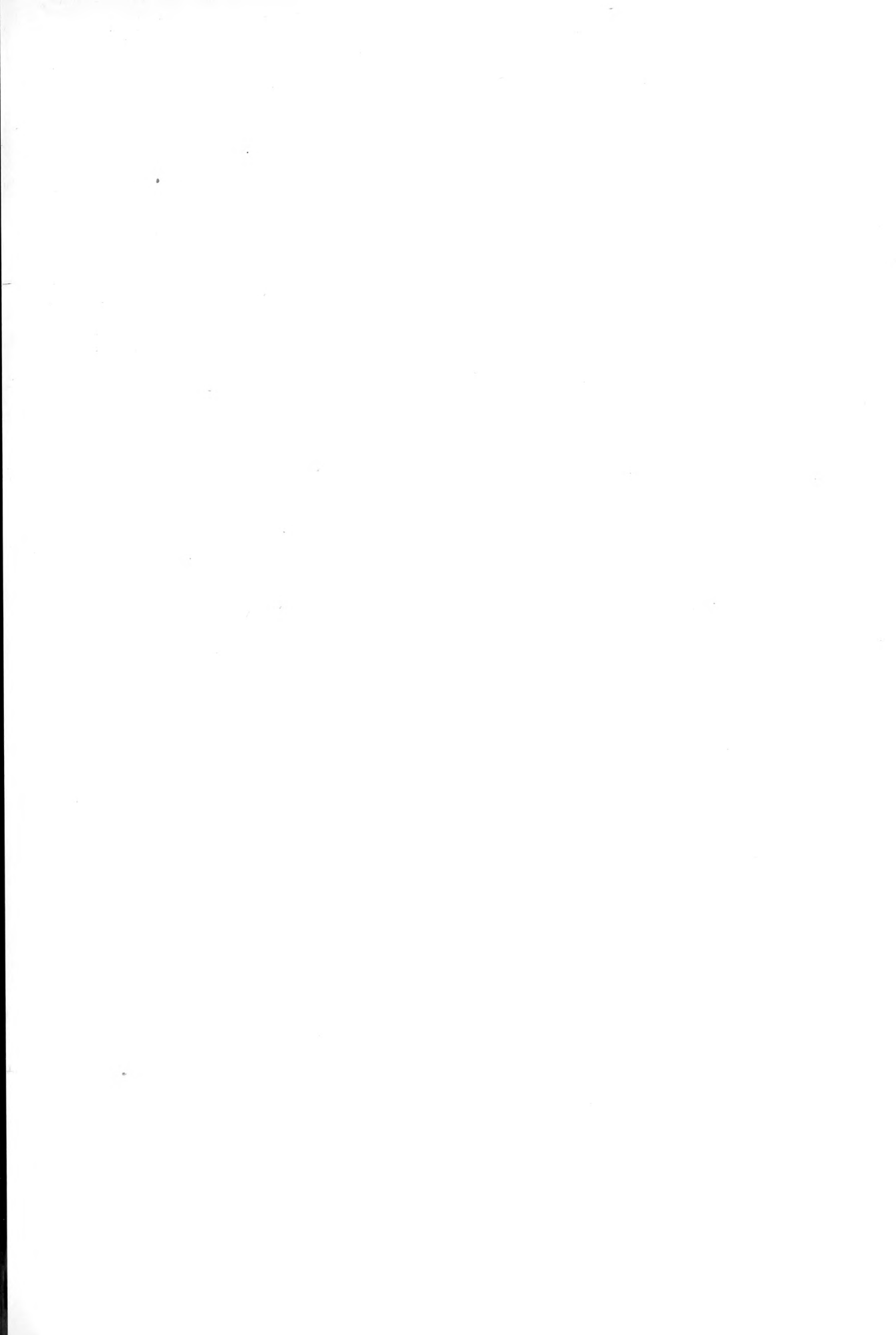
8. The combination of a revolving support in operative relation with a recording or reproducing device, a magazine traveling therewith and carrying a sound-recording material in the form of a continuous strip rolled up within said magazine, and means for intermittently presenting successive portions of said strip.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGE ABBOTT MANWARING.

Witnesses:

C. A. L. MASSIE,
R. L. SCOTT.



C. L. HIBBARD.
SOUND MODIFIER.

APPLICATION FILED MAR. 20, 1905.

Fig. 2.

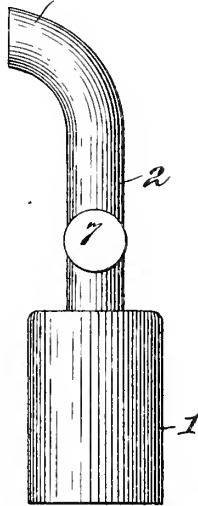


Fig. 3.

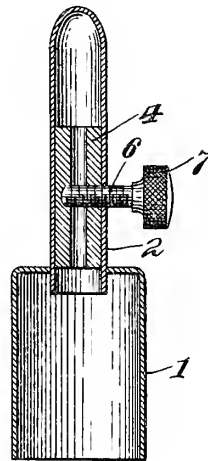


Fig. 4.

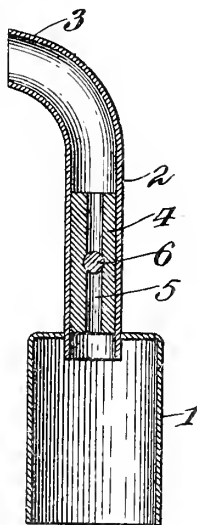
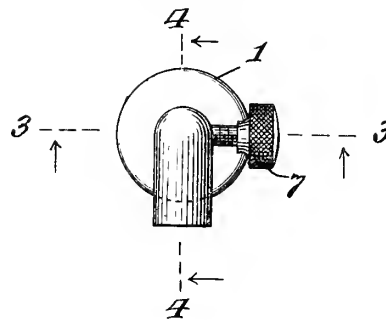


Fig. 1.



Witnesses
Edgeworth
Delos Holden

Inventor
Charles L. Hibbard
By his Attorney
Frank L. Rice

UNITED STATES PATENT OFFICE.

CHARLES L. HIBBARD, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-MODIFIER.

SPECIFICATION forming part of Letters Patent No. 793,442, dated June 27, 1905.

Application filed March 20, 1905. Serial No. 251,026.

To all whom it may concern:

Be it known that I, CHARLES L. HIBBARD, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound - Modifiers, of which the following is a specification.

In using phonographs and similar talking-machines for commercial purposes, such as the dictation of letters and other documents and also in using such machines for the study of a language, it is customary for the person listening to the phonographic reproduction of the sound-records of the said letters or lessons to use ear-tubes leading from the reproducer of the instrument. It is found, however, that frequently the sounds given out by the reproducer are so powerful as to produce an unpleasant effect upon the listener, especially one whose sense of hearing is very acute. It is for this reason desirable that means be provided whereby the sounds thus given out by the reproducer mechanism may be modified or reduced in intensity or volume. It is also desirable that such means shall be so constructed as to be capable of being readily attached to or detached from a talking-machine and preferably that it shall be capable of being readily connected with or disconnected from the ear-tubes which are in common use; also, that it shall be so designed as to be capable of ready and delicate adjustment, whereby the volume of sound may be adapted to any particular ear.

My invention has for its object the provision of a device having the characteristics above set forth.

Reference is hereby made to the accompanying drawings, illustrating one form of device in which my invention may be embodied, in which—

Figure 1 is a plan; Fig. 2, a side elevation; Fig. 3, a section on the line 3 3 of Fig. 1, and Fig. 4 a section on the line 4 4 of Fig. 1.

The same numerals of reference are used to indicate corresponding parts in the several views.

The device as preferably constructed consists of a tubular structure comprising a hollow base 1, cylindrical in form and of such internal diameter as to snugly fit upon the upwardly - projecting neck of reproducers in common use in talking-machines. In the upper portion of the hollow base is fixed a tube 2, leading upwardly therefrom and whose upper end 3 is curved forward, as shown, so that the sound-waves will be directed forward. It is also obvious that a flexible connection can be fitted thereon and lead upward to the ears without danger of stopping or constricting the passage for the sound-waves.

Within the tube 2 is fitted a plug 4, provided with an air-passage 5, preferably of small diameter. Transversely of the passage 5 is located a screw 6, threaded in the block 4 and having a milled head 7 for convenience in turning. This screw extends entirely across the passage 5 when in its extreme inner position, thus entirely closing the said passage and cutting off the sound-waves completely. By turning the screw so as to move the same outward the passage 5 is opened to any desired extent, whereby the volume of sound which reaches the ears of the listener may be correspondingly modified or regulated from nothing to the full volume of sound given out by the reproducer.

Various modifications in the proportions and arrangement of parts will be apparent to those skilled in the art.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. As a new article of manufacture, a sound-modifier comprising a hollow base adapted to be fitted upon the neck of a talking-machine reproducer, a reduced tubular portion in communication with said hollow base, and a regulating-valve, substantially as set forth.

2. As a new article of manufacture, a sound-modifier comprising a hollow base adapted to be fitted upon the neck of a talking-machine reproducer, a reduced tubular portion having its upper end curved forwardly and its lower end in communication with said hollow base,

and a regulating-valve, substantially as set forth.

5 3. As a new article of manufacture, a sound-modifier comprising a hollow base adapted to be fitted upon the neck of a talking-machine reproducer, a reduced tubular portion in communication with said hollow base, a plug having an air-passage therethrough and a screw

threaded into said plug across said air-passage, substantially as set forth.

This specification signed and witnessed this 10
18th day of March, 1905.

CHARLES L. HIBBARD.

Witnesses:

DELOS HOLDEN,
FRANK L. DYER.



No. 793,627.

PATENTED JUNE 27, 1905.

F. MYERS.
PHONOGRAPH.

APPLICATION FILED DEC. 15, 1903.

2 SHEETS—SHEET 1.

FIG. 1.

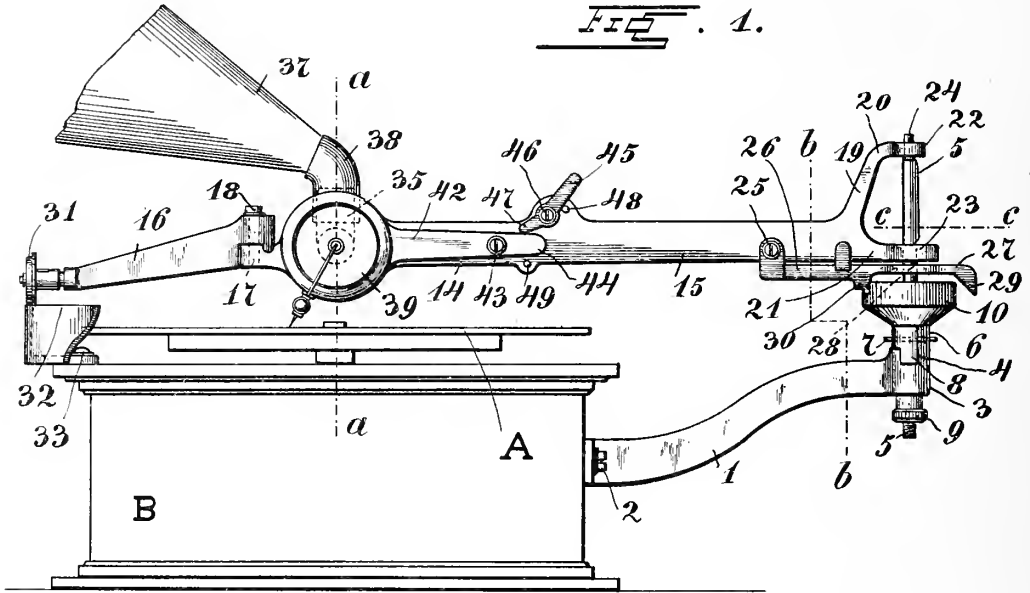
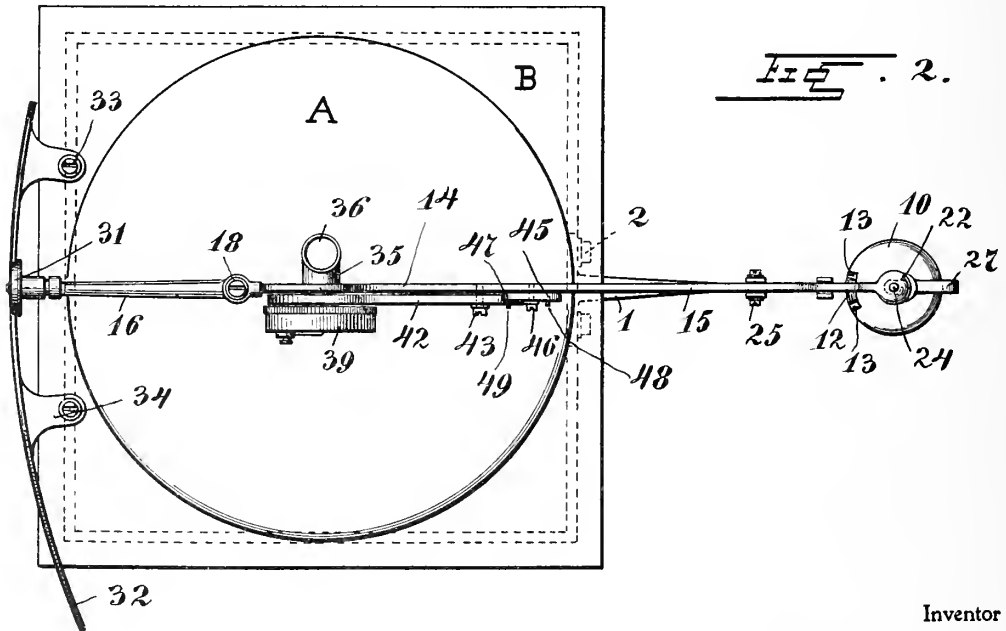


FIG. 2.



Inventor

Frederick Myers

By

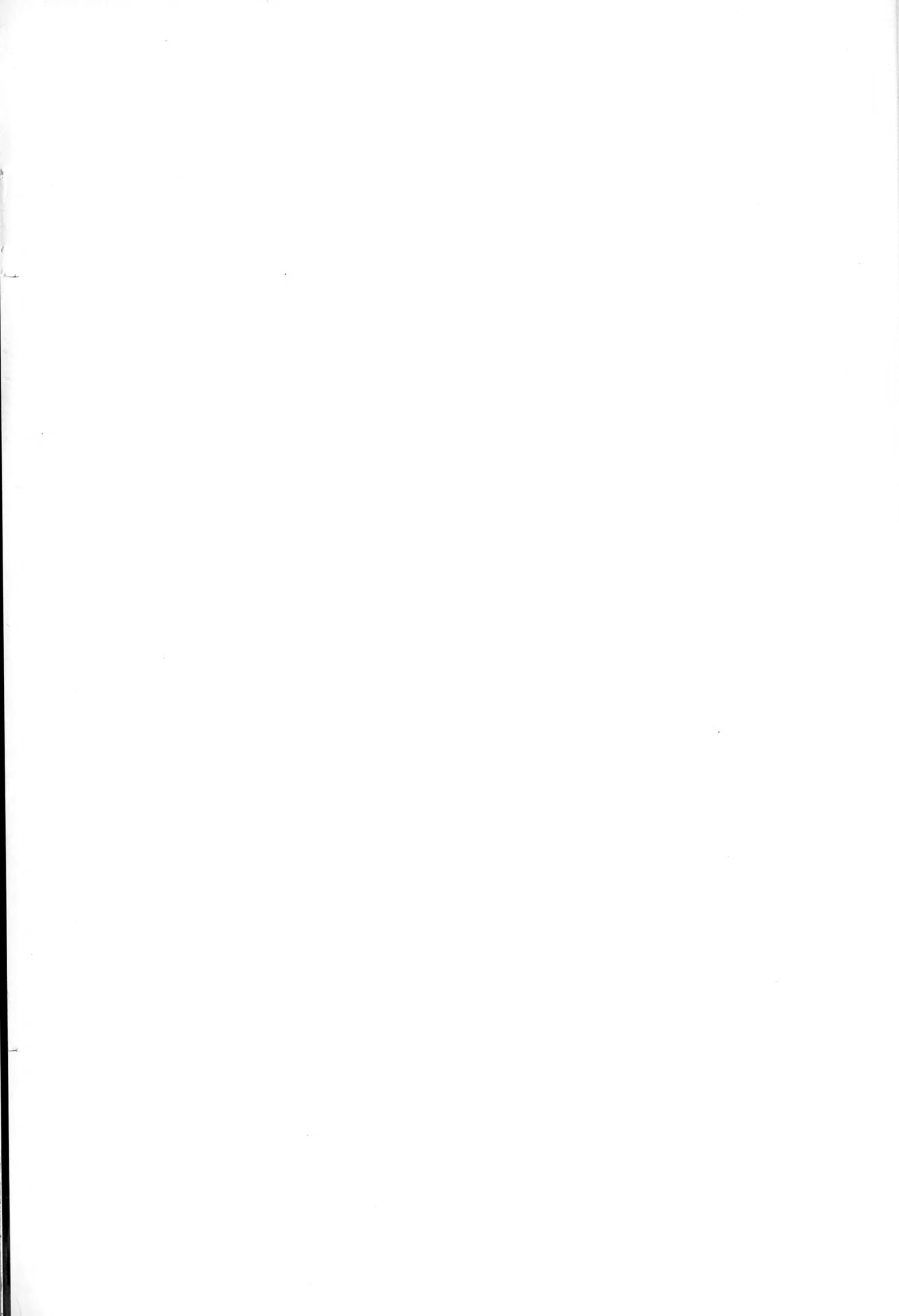
A. B. Wilson

Attorney

Witnesses

W. Munson

A. B. Wilson



F. MYERS.
PHONOGRAPH.

APPLICATION FILED DEC. 15, 1903.

2 SHEETS—SHEET 2.

FIG. 3.

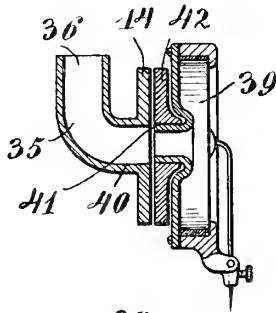


FIG. 4.

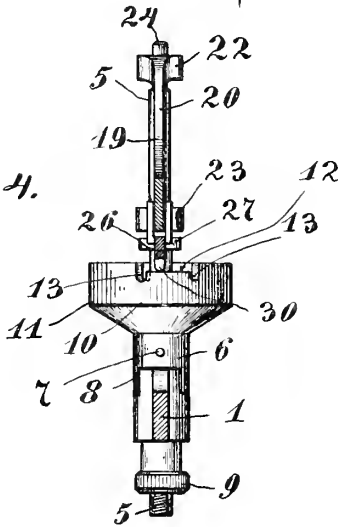
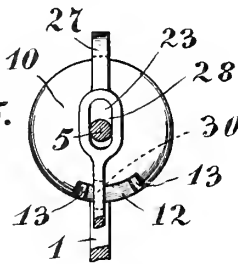


FIG. 5.



Inventor

Frederick Myers

Witnesses

K. Munkser

A. B. Wilson

By

A. B. Wilson

Attorney

UNITED STATES PATENT OFFICE.

FREDERICK MYERS, OF NEW YORK, N. Y.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 793,627, dated June 27, 1905.

Application filed December 15, 1903. Serial No. 185,311.

To all whom it may concern:

Be it known that I, FREDERICK MYERS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Phonographs; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in phonographs, using the term to include all instruments which reproduce articulate speech and other sounds, my invention relating particularly to means for permitting the horn to be turned in any required direction and for disposing the sound-box or device used in connection with the disk or record for recording or reproducing articulate speech and other sounds immediately adjacent to the inner end of the horn to prevent loss of volume of the sound between the sound-box and horn.

My invention consists in the construction and combination of devices hereinafter described and claimed.

One object of my invention is to provide in apparatus of the class described a pivoted horn which may be turned in any direction and a sound-box-carrying element movable at an angle to the plane of movement of the horn and across the intake of the latter.

A further object is to combine with a movable arm a horn-intake carried thereby, a sound-box carrier movable with the arm and also movable independently of and in a plane perpendicular to the plane of movement of said arm, and a sound-box carried by the sound-box carrier positioned thereby in operative relation to the horn-intake and movable with the carrier transversely with reference to the horn-intake.

A further object is to combine a movable supporting element having a tubular elbow forming the intake of and a pivotal support for and connection with a horn, a sound-box carrier connected to said element for movement therewith and also for movement in a different plane independently thereof, and a sound-box carried by said carrier positioned thereby in operative relation to and movable

therewith across the intake of said tubular elbow.

A further object is to provide, in combination with a pivoted arm movable in a horizontal plane, a horn-intake carried thereby, a sound-box carrier pivoted to the arm and movable therewith and also movable independently thereof in a vertical plane, a sound-box carried by the sound-box carrier positioned thereby in operative relation to and movable in a vertical plane across the horn-intake, and means carried by said arm to raise the sound-box carrier and sound-box and support them in a raised position.

A further object of my invention is to provide improved means for carrying the horn and sound-box, which means is adapted for pivotal movement and also for angular movement with respect to its pivot and toward and from the disk or other record.

A further object of my invention is to provide an improved pivoted arm for carrying the horn and the sound-box, means to lock the arm at the limits of its pivotal movement, and means to release it, said releasing means being operative by the movement of the arm at an angle to its pivot.

In the accompanying drawings, Figure 1 is an elevation of a phonograph embodying one form of my invention. Fig. 2 is a top plan view. Fig. 3 is a detail sectional view taken on the plane indicated by the line *a a* of Fig. 1. Fig. 4 is a similar view taken on the plane indicated by the line *b b* of Fig. 1.

My invention is here shown in connection with the form of phonograph or sound recording and reproducing instrument known as the "Victor talking-machine," which uses a revolving record-disk, (indicated at *A*.) I will have it understood, however, that my invention is adapted for use also in connection with other forms of instruments of this class, and I do not limit myself in this particular.

In accordance with the embodiment of my invention here shown I provide a bracket-arm 1, which is detachably secured to one side of the case *B* of the instrument by screws 2. At the outer end of the bracket-arm 1 is a vertically-disposed tubular enlargement 3, having in its upper end a transverse notch 4. A

vertical pivot-pin 5 has its lower portion passed through the vertical bore of the enlargement 3, is provided with a sleeve 6, secured thereto by a pin 7, which sleeve bears on the upper end of the said enlargement 3, and has a depending flange 8, which enters the notch 4 and serves to prevent the pivot-pin from turning. A nut 9, having a milled head, is screwed on the lower portion of the pivot-pin and bears against the under end of the enlargement 3.

At the upper end of the sleeve 6 and clasped thereto or formed therewith is a cup-shaped device 10, having a vertical circular flange 11, concentric with the pivot-pin 5, which flange on the side opposite the box or case B is recessed, as at 12. At the ends of the said recess are depending notches 13.

The form of horn and sound-box carrying element here shown is an arm 14, which comprises an inner section 15 and an outer section 16, detachably connected together by a joint 17 and a bolt 18. The said joint and bolt effect a rigid connection between the two sections, as will be understood, and enable them to be readily taken apart, so that the carrying-arm may be compactly disposed for the purpose of storage and transportation. The inner end of the section 15 of said carrying arm or element is forked, as at 19, and provided with an upper arm 20 and a lower arm 21, which are respectively provided with eyes 22 23. The eye 22 is circular in form to receive the reduced upper end portion 24 of the pivot-pin 5, and the eye 23, through which also the pivot-pin passes, is elongated, as shown in Fig. 5. This construction of the carrying arm or element enables it to move pivotally and to also move vertically or at an angle with reference to its pivot, the extent of the said angular movement being limited by the length of the elongated pivotal eye 23, as will be understood. On the under side of the carrying arm or element at its inner end and pivotally connected thereto, as at 25, is a detent 26, which has an outwardly-extending arm 27, provided with an opening 28, which clears the pivotal pin 5, and having at its outer end on its under side a cam 29, which extends downwardly therefrom and the inner side of which is inclined substantially at an angle of forty-five degrees, as shown, and is adapted to coact with the opposing flange 11 of the cup 10, as hereinafter stated. The said detent 26 is further provided on its under side with a depending key 30, which extends into and travels in the recess 12 of the cup device 10 and coacts with the stops formed by the ends of the said recess to limit the pivotal movement of the carrying arm or element 15. Furthermore, the detent 26, by reason of its gravitating action, drops the key 30 into the notches at the extreme limits of the pivotal movement of the carrying arm or element 15 to lock the same, as will be understood.

At the outer end of the carrying-arm section 16 is mounted a wheel or roller 31. The same operates on a segmental track 32, which is concentric to the pivot-pin 5 and is detachably secured on the box or casing B by screws or other suitable devices 33, which pass through supporting-lugs 34, with which said segmental track is provided. The carrying-arm 15 extends across and over the record-disk A and moves from near the center to a point slightly without the periphery thereof at one side. A tubular elbow 35, which forms, in effect, the intake of the horn, extends from one side of the carrying arm or element 14 and is upturned vertically at its outer end, as at 36. The horn 37 for amplifying the sound, and which may be of any suitable construction, is provided at its inner end with a cylindrical portion 38, which is bent to form a downwardly-extending elbow and is telescopically fitted on the vertical portion 36 of the elbow 35. Thereby the horn is pivotally mounted and is enabled to be turned in any desired direction. It will be understood that there is an opening through the carrying-arm 14, with which the bore of the elbow 35 communicates.

The sound-box 39 is indirectly carried by the carrying element 14. It is here shown as provided with a tubular projection 40, adapted to fit in an opening 41 near the outer end of an arm 42, which is pivotally connected to the section 15 of the carrying arm or element 14, as at 43. The said pivot 43 is at some distance from the inner end of the arm 42, so that the latter is formed with a projection 44. The element which I herein designate as the "sound-box" is, generically speaking, the means which coacts with the record or disk for making records or for reproducing sound. It may be of any suitable construction; as specifically it is no part of my present improvement, and I do not desire to limit myself in this particular, as within the scope of the appended claims any form of sound-box or record-making or sound-reproducing means may be employed in connection with my invention. By thus securing the sound-box to the arm 42 the same is disposed immediately adjacent the inner end of the horn, as is clearly shown in the drawings, so that there is no loss in the volume of the sound between the sound-box and the inner end of the horn.

Since the sound-box is carried by the arm 42, which is pivotally connected to the carrying-arm 14, it follows that the sound-box is movable independently of the said carrying-arm and transversely with reference to the intake of the horn, so that it is adapted to play vertically, as may be required to enable it to adapt and adjust itself to inequalities in the surface of the recording-disk A. Such disks are rarely ever exactly true or plane. By thus enabling the sound-box to move independently of the horn-carrying arm, which

also indirectly carries the sound-box, the latter is enabled to adapt itself to the exact condition of the surface of the record-disk, and hence I obtain superior results.

5 To enable the sound-box to be moved upwardly from the record or disk and to be maintained in an elevated position out of operative relation thereto, I provide a lever 45, which is disposed on one side and is pivotally connected to the section 15 of the arm or carrying implement 14, as at 46, and has an inclined extension or cam 47 at its lower end, which engages the upper side of the extension 44 of the pivoted arm 42. A stop-stud 48 maintains the said lever normally in the position shown in Fig. 1. By turning the said lever in the direction of the arrow indicated in the said figure its cam 47, by engagement with the extension 44 of the arm 42, lifts the outer end of the latter, which directly carries the sound-box, so as to lift the latter and maintain the same in elevated position. Stop-stud 49 limits the movement of the said arm 42.

By the provision of the stop-notches 13 and detent 26, hereinbefore described, the pivoted arm 14, which carries the horn and the sound-box, is locked when it is pushed to its extreme limit of movement in one direction or the other and held in place while the record or disk is being changed or a new pin provided for the sound-box. By provision of the pivoted arm 14 with the elongated eye 23, which adapts the said arm for angular as well as pivotal movement, the outer end of the arm may be lifted to some extent by taking hold of it, to enable the operator to move the arm pivotally and set the pin or needle of the sound-box or record-engaging device at any desired point on the record. It will be understood that by thus lifting the outer end of the arm 14 the inclined face of the cam 29 is caused to engage the flange 11 of the cup device 10, so as to raise the detent 26 and disengage its key 30 from the recess 12, thus permitting pivotal movement of the arm to any desired extent. The provision of the arm 42 with the opening 41 and the construction of the sound-box with the projection 40 enables the sound-box to be readily attached to the arm 42, and hence to the arm 14, and detached therefrom at will.

I do not desire to limit myself to the precise construction and combination of devices hereinbefore described, as modifications may be made therein without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

60 1. In apparatus of the class described, the combination of a supporting element movable in a horizontal plane, a horn-intake carried thereby, a sound-box carrier connected to said element and movable independently thereof in a vertical plane, a sound-box carried by the

sound-box carrier, positioned thereby in operative relation to and movable vertically across the horn-intake, and means carried by the said supporting element, to raise the sound-box carrier and the sound-box and support the same in a raised position, substantially as described. 70

2. In apparatus of the class described, a pivoted horn and sound-box carrying element movable also at an angle to its pivot, and means to lock the said element at the limits of its pivotal movement, said means releasing said element when the latter is moved in one direction angularly with reference to its pivot. 75

3. In apparatus of the class described, a pivoted horn and sound-box carrying element, in combination with a stop device, and a detent controlled by the movement of the said carrying element and coacting with the stop device to lock the said carrying element at the limits of its movement. 80 85

4. In apparatus of the class described, the combination of a pivot and a fixed stop device having stop-notches, a horn and sound-box carrying element mounted on the pivot and also movable angularly with reference thereto, and a gravity-detent, carried by said pivoted carrying element, coacting with the stop-notches of the stop device to limit the pivotal movement of the said carrying element, and caused to disengage the said stop-notches by an angular movement of the said carrying element in one direction. 90 95

5. In apparatus of the class described, a pivoted horn and sound-box carrying arm, having means to lock it at the limits of its pivotal movement, and means to release it, operated by a movement of the arm at an angle to its pivot. 100

6. In apparatus of the class described, a pivoted arm movable in a horizontal plane, a horn-intake carried thereby, a sound-box carrier pivoted to said arm and movable therewith and also movable independently thereof in a vertical plane, a sound-box carried by the sound-box carrier, positioned thereby in operative relation to and movable in a vertical plane across the horn-intake, and means, carried by said arm to raise the sound-box carrier and sound-box and support them in a raised position, all in combination, substantially as described. 105 110 115

7. In apparatus of the class described, the combination of a movable supporting element having a tubular elbow forming the intake of and pivotal support for and connection with a horn, and a sound-box movable with said supporting element, and positioned in operative relation to and independently movable across the intake of the said elbow, substantially as described. 120 125

8. In apparatus of the class described, the combination of a movable supporting element having a tubular elbow forming the intake of and a pivotal support for and connection with 130

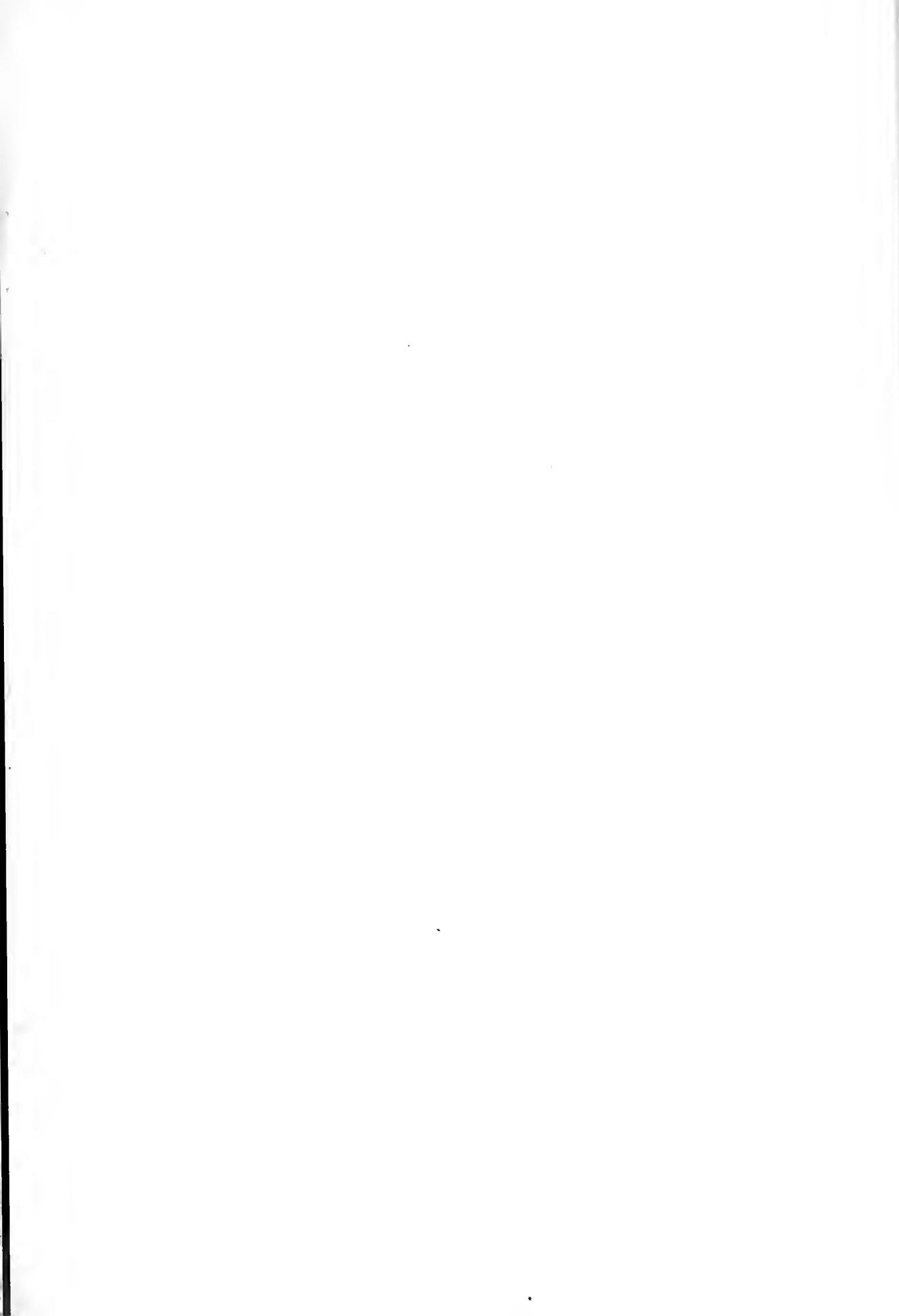
a horn, a sound-box carrier connected to said
 element for movement therewith and also for
 movement, in a different plane, independently
 thereof, and a sound-box carried by said car-
 5 rier, positioned thereby in operative relation
 to and movable therewith across the intake of
 said tubular elbow, substantially as described.

In testimony whereof I have hereunto set
 my hand in presence of two subscribing wit-
 nesses.

FREDERICK MYERS.

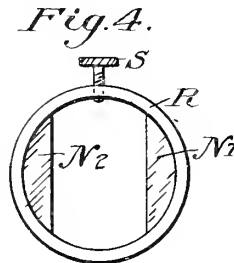
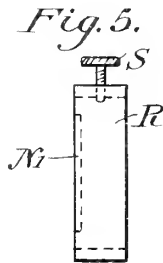
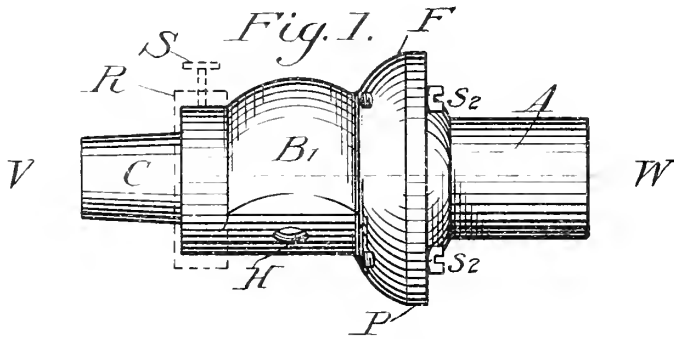
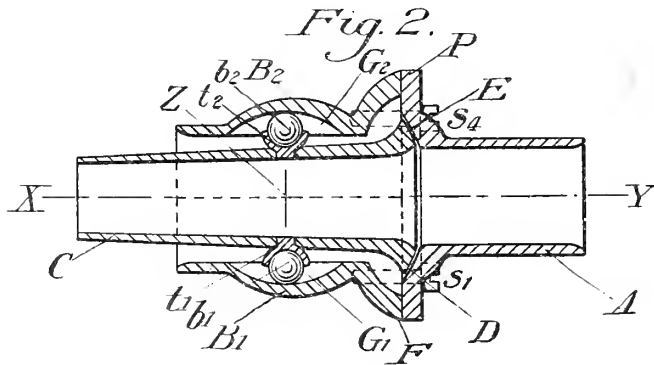
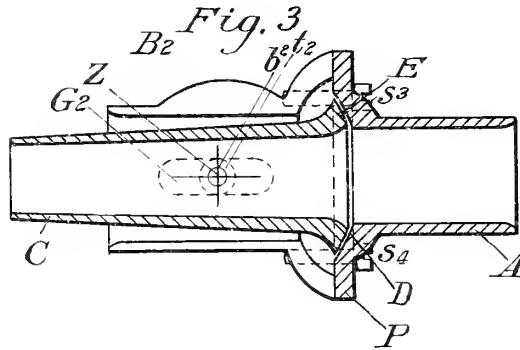
Witnesses:

T. M. BLEAKLEY,
 E. H. McCRUM.



A. FISCHER.
PHONOGRAPH.

APPLICATION FILED APR. 4, 1904.



Witnesses.
Edward William Cox.
Rosie Florence Pinner.

Inventor.
ALEX FISCHER,
by Herman W. W. W. ATT'Y.

UNITED STATES PATENT OFFICE.

ALEX FISCHER, OF LONDON, ENGLAND.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 793,778, dated July 4, 1905.

Application filed April 4, 1904. Serial No. 201,591.

To all whom it may concern:

Be it known that I, ALEX FISCHER, a subject of the Emperor of Austria-Hungary, residing at 38 and 39 Bolliter Square Buildings, London, E. C., England, have invented a certain new and useful Improvement in Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in movable joints used in connecting the reproducer or recorder of a phonograph to the trumpet or sounding device; and the object of my invention is to obtain a sound-proof joint which will be free from causing any secondary metallic noises when recording, such as the grating noise so frequently observed when reproducing phonographic records, and to obviate the necessity of disturbing the arrangement of the joint when changing from recording to reproducing, and vice versa, as necessitated by other constructions. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure I is an outside view of the joint; Fig. II, a cross-section of the same on the line V W; Fig. III, a cross-section on the line X Y; Figs. IV and V, different views of the collar to be used when recorder is employed.

Similar letters refer to similar parts throughout the several views.

A represents the cylindrical end of the joint, to which the trumpet or sounding device may be attached by suitable means, preferably by a piece of rubber tubing.

B' B² represent the outside casing of the joint, consisting of two halves held rigidly against the circular face-plate P of A by four screws s' s² s³ s⁴, and which is rigidly attached to the sliding carriage of the phonograph by means of thumb-screws. H represents the socket for one of these screws.

C represents the movable trumpet-shaped part of the joint, to which the reproducer or recorder may be attached.

D is the concave rim of A; E, the convex lip of C.

F represents the flaring rim of the outer casing B' B².

G' G² represent grooves in B' and B², respectively.

b' b² represent steel balls moving in the grooves G' G² and the cups provided in the ends of trunnions t' t², respectively.

R represents a collar, which may be fastened on B over C when recording, by means of thumb-screw S, preventing the side motion of C by the coulisses N' N², fastened to R.

Z represents the common center of the concavity of rim D and the convex lip of E, as also of the grooves G' G².

The movable sound-proof joint, the object of my invention, is constructed on the general principle of a ball-and-socket joint. This joint consists of part A, to which the trumpet or sounding device may be attached in any suitable manner, rigidly connected to the casing B' B² by means of screws s'-s⁴, which again is suitably fastened to the sliding carriage of the phonograph. The moving part C of this joint consists of a trumpet-shaped tube, which within its limits may move in any direction and whose lip E is fitted closely in the hollow rim of the face-plate P of A. The outer casing consists of two equal halves B' and B². Fig. III shows the cross-section of the joint with B' removed. It is necessary to have the casing constructed in this manner in two parts for the proper adjustment of the ball-bearings in their corresponding grooves.

Part C is provided with trunnions t' t², the ends of which are shaped as ball-sockets to receive steel balls b' b², respectively, to act as bearings. These balls are adapted to move in the grooves G' G², provided in the outer casing B' B² and concentric both with the concavity D in face-plate P of A and the convex rim E of C, thus making a movement in any direction possible. When the apparatus is to be used for recording, an up-and-down movement alone is permissible, and the collar R is in this case slipped over the end of C and fastened on the casing B' B² by means of the thumb-screw S, thus preventing a side movement of C by means of the side plates or coulisses N' N², which reduce the opening of the collar to the exact outside diameter of C.

A joint constructed as above is practically

sound-proof and avoids all secondary metallic sounds caused by other kinds of construction.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A tubular connection between the sound-box and horn consisting of a tubular casing, a tubular mouthpiece connected to one end thereof and having a concave inner rim, a tapering tube within said casing having a convex end engaging said concave rim, and ball-bearing devices between the tapering tube and the casing permitting universal movement of said tapering tube within said casing.

2. A tubular connection between a sound-box and horn, comprising a tubular casing, a tube within said casing having normally a universal movement therein, and a removable means on said casing having means to limit the movement of said tube to a movement in one plane.

In testimony whereof I affix my signature in presence of two witnesses.

ALEX FISCHER.

Witnesses:

EDWARD WILLIAM COX,
ANNIE F. RICHARDSON.



T. H. MACDONALD.
SOUND REPRODUCER.
APPLICATION FILED APR. 17, 1903.

Fig. 1.

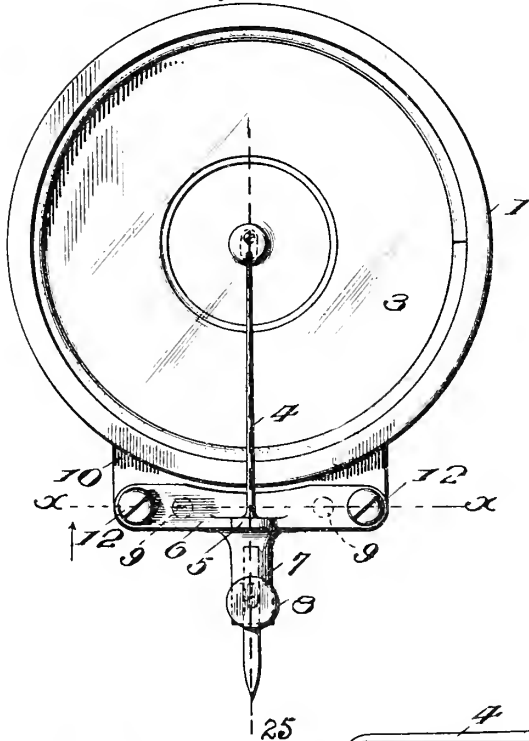


Fig. 2.

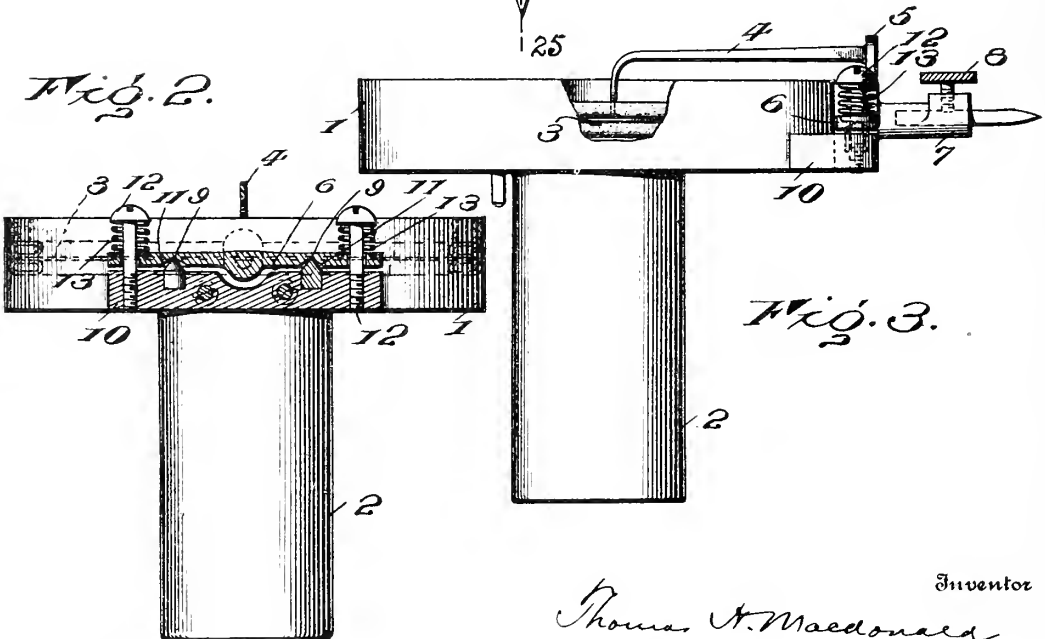


Fig. 3.

Inventor

Thomas H. Macdonald

By Charles Cannon Lewis

Attorney

Witnesses

Wm. B. Markham

Gustave R. Thompson

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

SOUND-REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 794,416, dated July 11, 1905.

Application filed April 17, 1903. Serial No. 153,143.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Sound-Reproducers, which invention is fully set forth in the following specification.

This invention relates to the construction of sound-reproducers for use with sound-records of the laterally-undulating type. In such reproducers the stylus and its carrying-bar constitute a lever of the first-class fulcrumed to the diaphragm box or casing. The improved reproducer may, however, be used with sound-records of the vertically-undulating type. It is important that the stylus-bar be attached to the casing by a rigid connection, loose joints, which give rise to rattling noises in operation, being avoided. To this end the stylus-arm has usually been attached to the casing by means of a flat spring or springs, which make a rigid connection, while permitting the limited vibration of the stylus-bar. In some cases the stylus-bar has been mounted to rock on a knife-edge or on centers, being held firmly thereon by spring-pressure exerted on one or on both sides of the axis of oscillation at points relatively remote to said axis. In all such constructions it is manifest that the stylus-bar in vibrating has not only to actuate the diaphragm, but has to overcome spring-pressure in its movement in one or both directions. Study of the operation of such instruments shows that they cause undue wear upon the records and that while giving good and full reproductions of loud fundamental tones do not render well the finer shades of sound represented by the overtones. The explanation is that the overtones which give "quality" or "tone color" to the sounds are represented in the sound-record by very minute irregularities or undulations. A stylus drawn with considerable power and speed along these undulations must be able to vibrate with minimum resistance and friction in order to respond to them. The resistance of the stiff spring or springs above referred to prevents such responsiveness, and hence these finer irregularities are inadequately re-

produced and with relatively little wear are obliterated.

The present invention consists in a stylus-mounting which secures the requisite rigidity with minimum friction and resistance. To this end the stylus-bar (or a rock-bar to which it is rigidly attached) is supported on steel centers brought to a fine point, so that friction is practically eliminated, which centers are held to their bearings by pressure exerted in the plane of the axes of the centers, offering very slight resistance to the vibration of the stylus-bar and diaphragm in either direction. This pressure may be obtained by a spiral spring or springs in the plane of the centers. A spring of this kind while giving all the pressure desired in the line of its axis is free to oscillate laterally, and hence offers little, if any, resistance to the rocking of the lever. In lieu of spiral springs rubber tubing or cushions may be used; but metal springs are preferred. This pressure can be made as great as necessary to insure that the bar is not unseated. This construction is radically different from that wherein the stylus-bar rocks upon a knife-edge or centers in a plane parallel to that of the stylus-bar and is held on its bearings by spring-pressure. In such case the vibration causes a side movement upon the knife-edge, to oppose which a heavy spring-pressure is necessary, and this spring-pressure opposes the vibration of the diaphragm, to a greater or less extent obliterating the overtones. Furthermore, the spring (if one be used) has a tendency after the lever is thrown off its center to carry it still farther off, so that generally two springs are used, one working in opposition to the other.

In the present invention the lever-arm is simply fulcrumed on the centers (or knife-edge) on one side and on spiral springs on the other, the axes of the centers being at right angles with (instead of parallel to) the stylus-arm.

This construction serves, further, to keep the diaphragm perfectly neutral, there being no stress in either direction.

In the accompanying drawings, Figure 1 is

an elevation looking toward the diaphragm of a reproducer constructed in accordance with the invention. Fig. 2 is a cross-section on line *xx*, Fig. 1; and Fig. 3 is a side view.

1 represents the diaphragm-casing, 2 the sound-conveying tube, and 3 the diaphragm. The stylus bar or lever 4 is attached at one end to the diaphragm in any suitable way. At the other end it is rigidly attached to a projection 5 of rock-bar 6.

7 is the continuation of the stylus-bar, having the usual socket to receive the stylus and the set-screw 8 to hold it in place.

Parts 4, 5, 6, and 7 constitute one solid piece. Rock-bar 6 is balanced on pointed centers 9 on a block 10, which is an extension of the diaphragm-casing, bar 6 being provided with conical seats 11, Fig. 2. The seats 11 have a greater angle than centers 9, the latter being, say, sixty degrees and the former forty-five degrees. Block 10 is also drilled to receive two screws 12, which pass loosely through holes in bar 6, the axes of the screws 12 and of the centers 9 being all in the same plane and being at right angles to the stylus-bar 4. Between the heads of screws, pins, or post 12 and bar 6 are compressed coiled springs 13, which press the bar firmly upon its centers. Owing to the form and location of these springs, the pressure necessary for this purpose is secured without putting any stress on the diaphragm or materially opposing its vibration. Where the spring is attached at one side of the line of oscillation, the above-mentioned disadvantages result, and, moreover, the stylus-bar has a tendency to pivot where the spring is attached and unseat itself from its fulcrum, causing a side movement thereon and gradually loosening and wearing the bearing. In the construction herein shown the tendency of the spring-pressure is always to set the centers more firmly in their seats. The construction is that of a lever fulcrumed on one side upon the centers and on the other side upon coil-springs.

It will be seen from Fig. 2 that the points of centers 9 and the bearings of springs 13 are all in the same line and that this line, which is the axis of oscillation of the stylus-bar, also intersects the axis of the extension 7 of the stylus-bar. It will also be seen that this line of oscillation is in the plane of the diaphragm 3, so that in normal conditions the neutrality of the latter is preserved and it is in the best condition to respond to the vibrations transmitted from the record. It will further be seen that the axes of the centers 9, springs 13, and screws 12 are all in the same plane, (represented by line *xx*, Fig. 1,) which plane passes through the axis of oscillation of the bar and is transverse to the plane (represented by line 25, Fig. 1) in which the stylus-bar oscillates. The springs therefore exert pressure in said plane *xx* to tension the

centers. In the particular embodiment shown in the drawings said plane, as well as the axis of oscillation of the stylus-bar, are both transverse to the axis of the stylus.

There is in the entire mounting a very slight resistance other than the inertia of the diaphragm to oppose the small vibrations representing the overtones, the absence of which renders the reproduction thin and unmusical.

The advantages of the construction may be in great part realized by substituting a knife-edge for the centers, and other modifications may be made without departing from the spirit of the invention.

What is claimed is—

1. In a sound-reproducer, a stylus-bar mounted to oscillate on an axis transverse to the axis of the stylus, and means for exerting pressure in a plane of said axis of oscillation transverse to said stylus to tension said bearing of said bar.

2. In a sound-reproducer, a stylus bar or lever fulcrumed on centers and means for exerting pressure to tension said centers, said pressure being exerted in the plane of the axes of the centers, and the plane of the axes of said centers being transverse to the plane of oscillation of said bar.

3. In a sound-reproducer, a stylus-bar mounted to oscillate on an antifriction-bearing, means for exerting spring-pressure in a plane of the axis of oscillation of said bar to tension said bearing, said plane being transverse to the axis of the stylus.

4. In a sound-reproducer, the combination with the diaphragm, of a stylus-bar mounted to oscillate upon an antifriction-bearing, a coiled compression-spring for holding the bar on said bearing, the axis of said coiled spring being substantially in a plane of the axis of oscillation of said bar transverse to the bar at the bearing.

5. In a sound-reproducer, the combination with the diaphragm, of a stylus-bar mounted to oscillate upon centers, and a coiled compression-spring for holding said bar on its centers, the axis of said spring being substantially in the plane of the axes of said centers, and a pin or post encircled by the spring, said pin or post having a head or projection against which one end of the spring bears in holding the bar on its centers and the axis of said pin or post being substantially in said plane of the axes of the centers.

6. In a sound-reproducer, a stylus bar or lever fulcrumed on centers and held thereon by spring-pressure exerted in the plane of the axes of the centers, which plane is transverse to the axis of the stylus.

7. In a sound-reproducer, a stylus-bar mounted to oscillate on an antifriction-bearing and held thereon by spring-pressure exerted in the plane of the axis of oscillation, said plane being transverse to the axis of the stylus.

8. In a sound-reproducer, a stylus-bar mounted to oscillate upon an antifriction-bearing, and held thereon by coiled compression-springs whose axes are in the plane of said bearing.

9. In a sound-reproducer, the combination with the diaphragm, of a stylus-bar fulcrumed upon centers at right angles to the axis of the stylus, and held upon said centers by spring-pressure exerted in the plane thereof.

10. In a sound-reproducer, the combination of a stylus-bar rigidly connected to a rock-bar having conical seats, pointed centers engaging said seats, and compression-springs holding said bar upon said centers, the axes of compression of said springs being in the plane of said centers.

11. The combination with the stylus-bar, of a mounting therefor comprising a rock-bar to which said stylus-bar is rigidly attached, said rock-bar having conical seats, pointed centers engaging said seats, the taper of said centers being more acute than that of the seats, and coiled springs pressing said bar upon said

centers, the axes of said springs being in the plane of oscillation of said bar.

12. The combination with the stylus-bar, of a mounting therefor comprising a rock-bar, pointed centers upon which said bar is seated, and coiled springs holding said bar against said centers, the points of the centers and the bearings of the springs against the bar being in the same plane.

13. The combination of the diaphragm, the stylus-bar carrying a stylus, centers upon which said bar is mounted to rock, and springs pressing said bar against said centers and acting in the plane of oscillation, said centers being in a line which intersects the axis of the stylus.

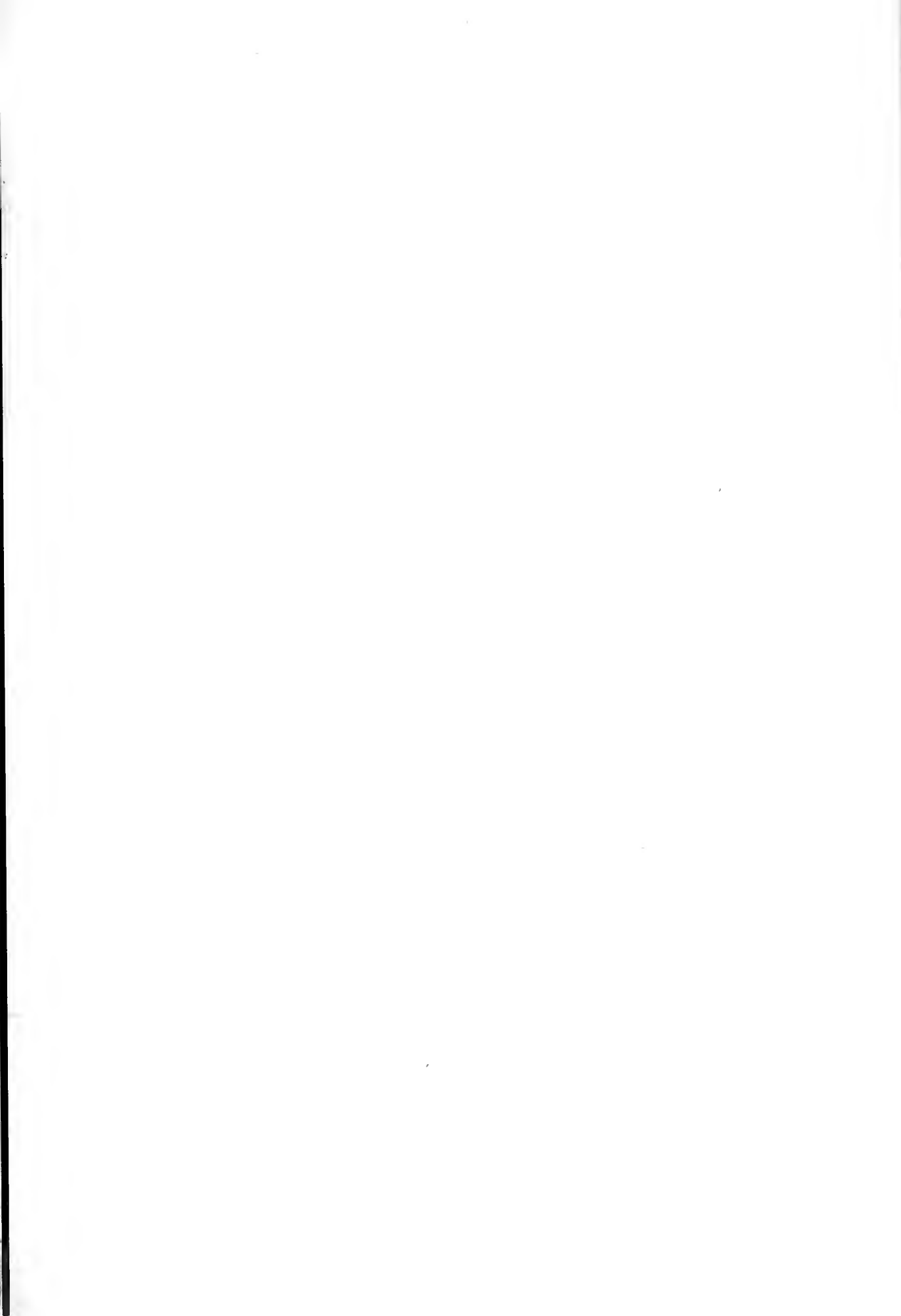
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,
M. A. FOGO.





No. 794,592.

PATENTED JULY 11, 1905.

E. N. DICKERSON.
RECORD CYLINDER FOR PHONOGRAPHS.
APPLICATION FILED MAR. 22, 1897.

Fig. 1,

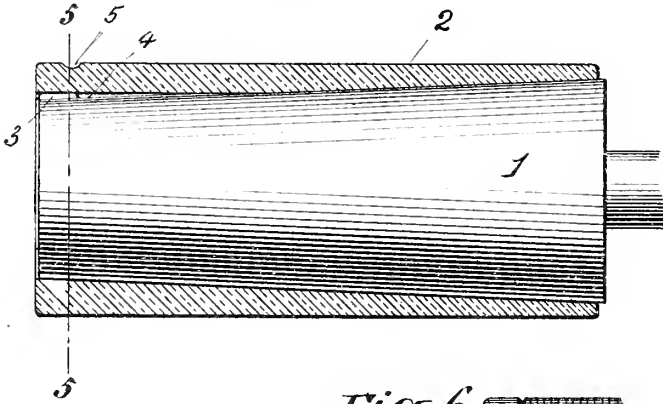


Fig. 2,

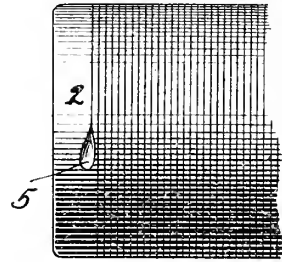


Fig. 6,

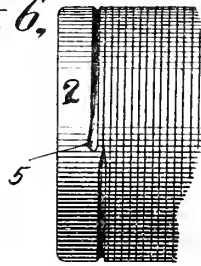


Fig. 3,

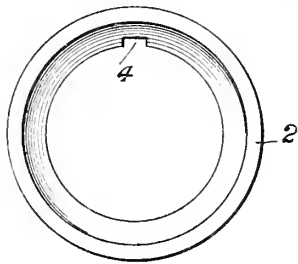


Fig. 5,

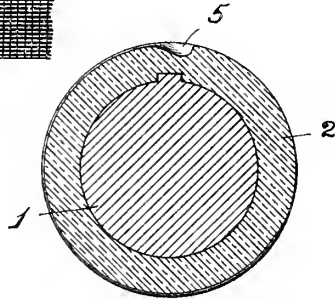
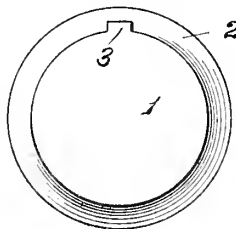


Fig. 4,



WITNESSES:

D. H. Kaywood

H. Coutant

INVENTOR

E. N. Dickerson

UNITED STATES PATENT OFFICE.

EDWARD N. DICKERSON, OF NEW YORK, N. Y.

RECORD-CYLINDER FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 794,592, dated July 11, 1905.

Application filed March 22, 1897. Serial No. 628,639.

To all whom it may concern:

Be it known that I, EDWARD N. DICKERSON, of the city, county, and State of New York, have invented a new and useful Improvement in Record-Cylinders for Phonographs, of which the following is a specification.

My present invention relates to record-cylinders for phonographs and similar sound recording or reproducing instruments, and especially in such instruments to means for positively engaging the recording-cylinder with its support in such manner that it may be readily placed in operating position and removed therefrom. Besides this the invention contemplates providing the recording-cylinder of such an instrument with a starting-point for the stylus which shall guide and direct the stylus into the sound-record when the instrument is used to reproduce sounds previously recorded, and when the cylinder is used for the first time to receive a sound-record the placing of the stylus in the starting-point insures that the stylus shall be properly started to make a sound-record.

In the drawings I have illustrated a form of record cylinder and support embodying my invention.

In the said drawings, Figure 1 is a side elevation of the mandrel of a phonograph supporting the record-cylinder, this latter being shown in section. Fig. 2 is a side elevation of a record-cylinder, partly broken away. Fig. 3 is a view of the record-cylinder looking at the wider end opening. Fig. 4 is an end view of the record-cylinder and mandrel seen when looking in the direction opposite to that of Fig. 3. Fig. 5 is a transverse section along line 5 5 of Fig. 1, and Fig. 6 is a view showing a modification of my invention.

Like figures of reference refer to like parts throughout the several views of the drawings.

Referring to the drawings in detail, 1 represents a mandrel for supporting the record-cylinder, which mandrel is suitably supported in the phonograph apparatus and is provided with a plain tapering surface.

2 represents the record-cylinder, which is made of the usual wax or paraffin composition and is provided with a tapering inner surface conforming to the shape of the mandrel.

Upon the mandrel at the narrow end thereof is a stop 3, inclined to the surface thereof, engaging in a recess 4, similarly inclined on the inner surface of the record-cylinder. While the stop and the recess are shown with parallel sides, they may be formed with the sides inclined to or from each other for a part or the whole of their length to facilitate the engagement of the stop with the recess. On the outer surface of the record-cylinder, commencing at a point directly or approximately over the stop 3, the record-cylinder is provided with a groove 5, gradually tapering toward the surface of the cylinder. This groove is for the purpose of receiving the stylus and serving as a starting-point therefor. When the cylinder is placed in position to receive a record, the stylus is placed in the groove (which may be colored to emphatically distinguish it from the rest of the cylinder) and the instrument set in operation to receive the sound-record. When it is desired to reproduce this record, the recess or groove is plainly apparent to the eye, and the stylus-point being placed therein and the instrument set in operation the groove guides the stylus-point into the line of indentations constituting the sound-record, and thus obviates all difficulty in finding the starting-point of the sound-record and placing the stylus therein, hence precluding all possibility of injuring the sound-record by misplacing the stylus-point. This groove may be comparatively short, as shown in Fig. 2, but I prefer to make it as shown in Fig. 6, since in this way it may be readily distinguished at whatever point of revolution the cylinder may be. By placing the stop 3 in definite relation to the starting-point 5 it is plain that an indication of position either upon the mandrel 1 or upon the shaft will readily indicate the proper starting-point for the stylus in case it is desired to start the same at the commencement of the deeper groove.

It is plain that so far as the guiding-groove is concerned this invention is applicable as well to spirally-grooved plates as to spirally-grooved cylinders.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A sound-record tablet provided with a

sound-record groove, and a wider stylus locating and guiding groove merging into the starting end of said record-groove.

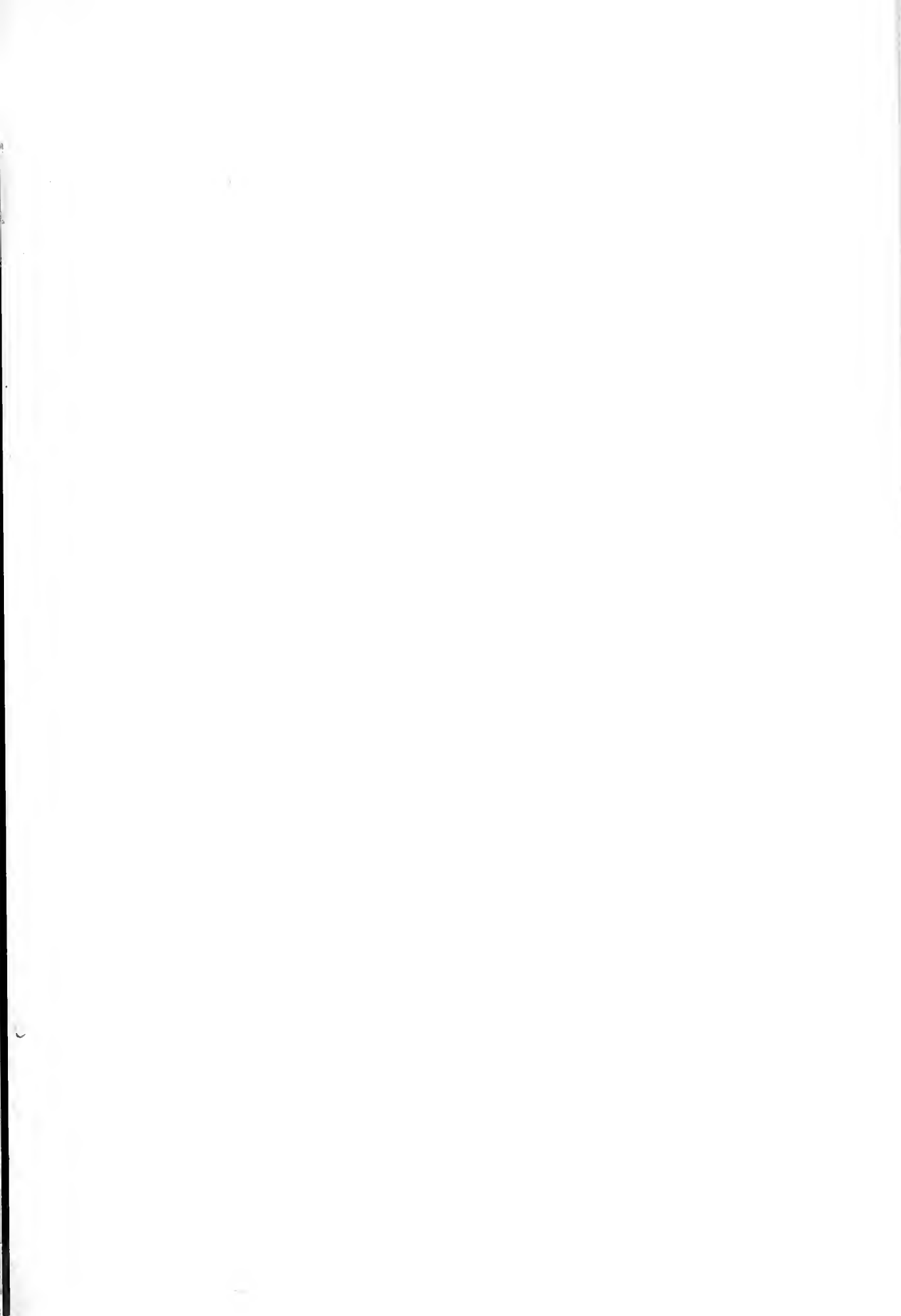
2. A sound-record tablet provided with a
5 sound-record groove and a wider and deeper stylus locating and guiding groove merging into the starting end of said record-groove.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

E. N. DICKERSON.

Witnesses:

W. LAIRD GOLDSBOROUGH,
H. CONTANT.



N. C. DURAND.
SOUND RECORD LOCATING DEVICE.
APPLICATION FILED MAR. 18, 1905.

Fig. 1.

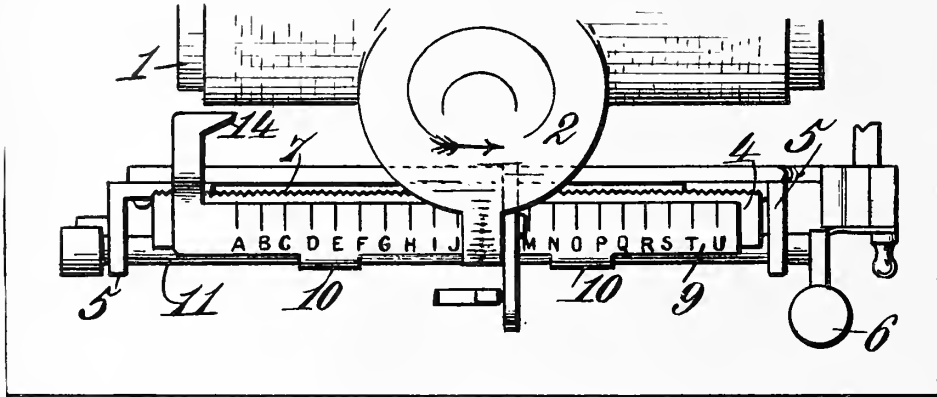


Fig. 2.

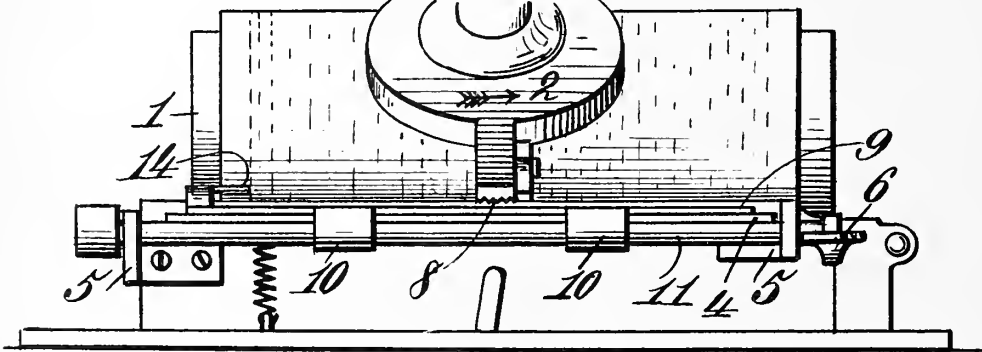
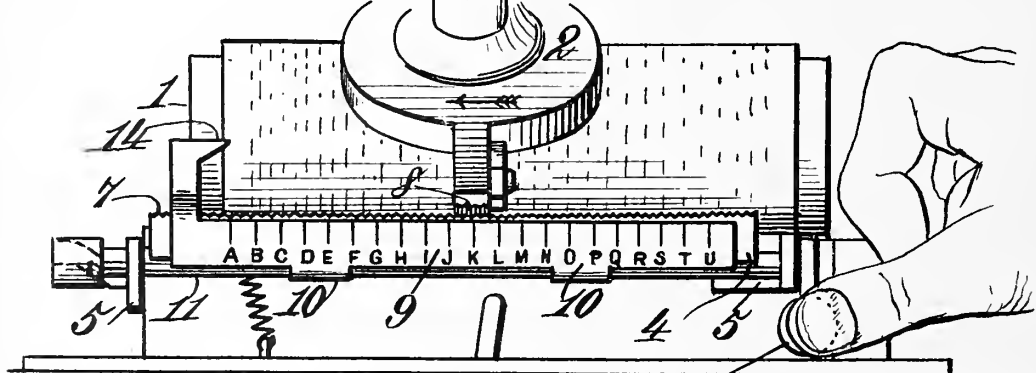
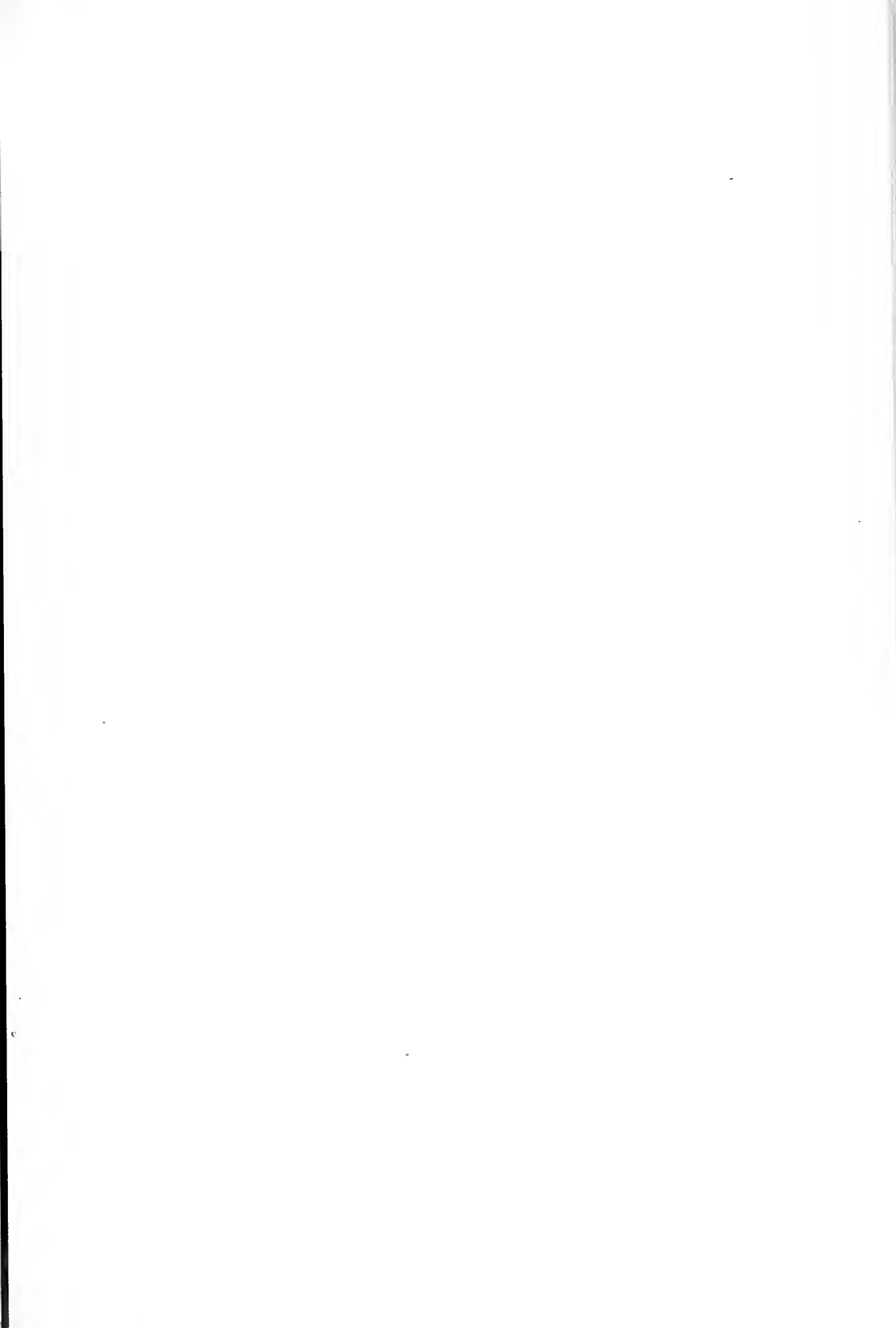


Fig. 3.



Witnesses,
Robert Elliott,
James L. Norris, Jr.

6 *Inventor,*
Nelson C. Durand.
By James L. Norris
Att'y.



N. C. DURAND.
SOUND RECORD LOCATING DEVICE.

APPLICATION FILED MAR. 18, 1905.

2 SHEETS—SHEET 2.

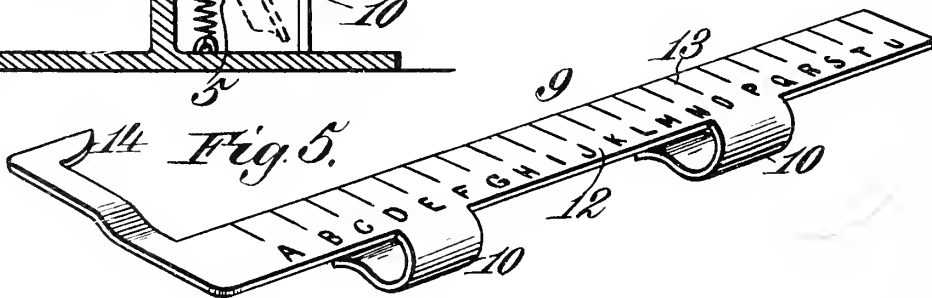
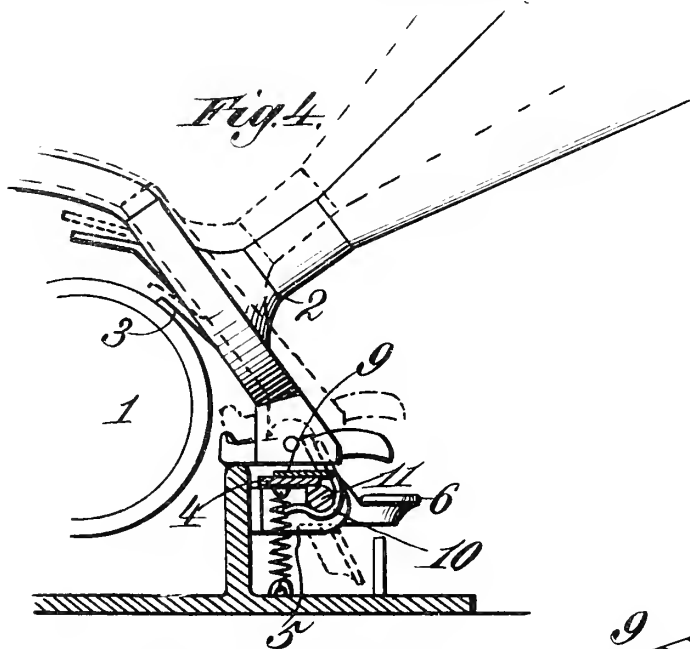


Fig. 6.

15.	A	mais,	but
	B	mal,	badly or poorly
	C	monsieur,	sir
	D	n'est-ce pas?	is it not so?
16.	E	non,	no
	F	ou,	or.
	G	oui,	yes
7.	H	parler,	to speak
	I	peu,	little.
	J	seulement,	only
	K	très,	very
	L	un	a or an
	M	un	an
	N	un	an
	O	un	an
	P	un	an
	Q	un	an
	R	un	an
	S	un	an

Witnesses:
Albert Corbett
James C. Norris, Jr.

Inventor:
Nelson C. Durand.
 By *James C. Norris*
Att'y.

UNITED STATES PATENT OFFICE.

NELSON C. DURAND, OF SCRANTON, PENNSYLVANIA, ASSIGNOR TO INTERNATIONAL TEXTBOOK COMPANY, OF SCRANTON, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SOUND-RECORD-LOCATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 794,599, dated July 11, 1905.

Application filed March 18, 1905. Serial No. 250,832.

To all whom it may concern:

Be it known that I, NELSON C. DURAND, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented new and useful Improvements in Means for Locating Matter Engraved on the Records of Sound-Reproducing Apparatus, of which the following is a specification.

My invention relates to a means or device to facilitate the ascertainment of the position or location of any desired sound—such as a word, phrase, or other succession of words—upon the record of a sound-reproducing apparatus, to the end that repetitions of desired sounds or of words may be had quickly and distinctly unassociated with sounds or words which the user does not desire to hear repeated.

My invention is intended particularly for use in connection with records containing courses of study—for example, language-lessons—and in the following specification will be described as applied to such use, although it will be understood that I do not restrict my invention to any particular use, but claim it for all the various uses for which it may be adapted.

In the instruction of languages or words or phrases of languages by the use of sound-reproducing apparatus the lessons are spoken by a professor of the language to an apparatus and graved on master-records, and a course of language-lessons covers approximately about twenty-five records. From the master-records numerous other records are produced and are sent to students of the language and repeated to them by a sound-reproducing apparatus, making up a system by which great results have been secured, since the student has his instructor always present and may have the lessons repeated as often as he may desire. Very often the student will desire to hear repeated some word or words or a passage with respect to the proper pronunciation or formation of which he is in doubt quickly and without having first to listen

to sounds, words, or phrases other than that in which he is for the time being interested in order that he may hear just the sound or sounds repeated to him quickly and distinctly and unassociated with other sounds. This desirable result it is the object of my invention to secure, and with such object in view the invention consists in a means or appliance suitably associated with a sound-reproducing apparatus and bearing suitable indicia corresponding to like indicia associated in a guide (such as a dictionary or lexicon) with the various sounds, words, or succession of words engraven on the records.

I claim my invention generically and specifically as hereinafter set forth.

In the accompanying drawings, illustrating my invention, wherein I have shown it as embodied in connection with a well-known type of sound-reproducing apparatus provided in a known manner with what is called "repeating attachment," but to which type of apparatus or to repeating attachments my invention is not restricted, Figure 1 is a plan view of a sound-reproducing apparatus associated with which is my improved index-scale. Fig. 2 is a front elevation. Fig. 3 is a view similar to Fig. 2, showing the position of the parts when the repeating attachment has been actuated for the purpose of setting back the stylus to a position to repeat matter which has just immediately preceding been spoken by the apparatus. Fig. 4 is a sectional view. Fig. 5 is a detail perspective of my improved index-scale. Fig. 6 is a view of a guide, such as a lexicon or dictionary, having indicia corresponding with the indicia of the index-scale associated with the sounds, words, or succession of words engraven on the records.

In the said drawings the reference-numeral 1 designates the record-holder of a sound-reproducing apparatus, 2 the speaker-arm, and 3 the stylus.

4 designates the speaker-arm-lifter bar of a known type of repeating attachment, which is journaled in suitable brackets 5, carried by the framework of the apparatus, and 6 a thumb-

lever by which said bar 4 may be rocked. The bar 4 is provided on one edge with teeth 7, which coact with teeth 8 on the speaker-arm to set said speaker-arm back in position to repeat that which has just been spoken before the thumb-lever is depressed and the bar 4 rocked to lift the speaker-arm and stylus from the phonographic record.

The repeating attachment and sound-reproducing apparatus generally are known and need not to be further described, as they form no part of my invention and are illustrated merely to show one operative embodiment of my invention.

In this illustrated embodiment the numeral 9 designates an index-scale, which, as shown, is adjustably and detachably connected to the apparatus by means of clips 10, which fit about the journal-rod 11 of the lifter-bar 4. It may be otherwise associated with the sound-reproducing apparatus or repeating attachment, and, as will be understood, may be used in connection with apparatus not provided with a repeating attachment, and may be fixedly or adjustably connected with the apparatus. This index-scale 9 is provided with suitable indicia 12, that shown consisting of letters—for instance, from “a” to “u.” It may also be, and preferably is, provided with leader-lines 13 to facilitate the positioning of the stylus opposite any given indicia. When the index-scale is arranged to be detachably connected to the phonograph apparatus, it is capable of adjustment with relation to the records arranged upon the holder 1 and will be provided with a pointer 14, the point of which, to secure greater accuracy, will be brought into coincidence with the commencement of the engraved lines on the record, so that the indicia of the scale will constitute an exact index with respect to the matter engraven in the record. This is desirable in that frequently the engraving of one record does not begin at exactly the same place thereon as the engraving on others, at times there being slightly more unengraved margins on some records than on others. By providing for adjustability of the index-scale said scale may be adjusted with the greatest nicety to the engravings on any given record. While desirable, however, it may not be indispensable, because any difference in point of commencement of engraving on different records is very slight, and satisfactory results are secured even though the index-scale be not adjustably arranged.

The reference-numeral 15 designates a guide—for instance, a lexicon or dictionary or of other description—in which all the sounds, words, or phrases or other succession of words are contained in regular succession according to their engraved relation on a record, and associated with these various sounds or words are indicia 16, corresponding to the indicia on the index-scale, there being a fixed relation

between such indicia. In practice each record in a course of language-lessons, of which, as stated, there are approximately twenty-five, is numbered consecutively from “1” on throughout the series of records. The guide in addition to the indicia 16 will have combined therewith a number of the record on which a given sound, word, or phrase or other succession of words will be found, as indicated at *a*. In the illustrated example of guide or lexicon the arrangement of words in said guide accords with or follows in succession the words engraven on a given record—say record No. 15. This, it will be understood, is but a simple example set out for simplicity. Where a complete lexicon or dictionary alphabetically arranged is made use of, the order of words may or may not bear the same interrelation that is sustained by the word or words of any given cylinder or cylinders; but it may be that, for example, the French word “*mais*” will be upon one cylinder and the word “*parler*” upon a different cylinder, as indicated by the numerals “15” and “7” appearing opposite to those words in the illustrated guide. This, however, is but an extension of the more simple idea of arrangement shown in the guide and does not differ in anywise in principle.

In preparing my invention for use a suitable mode of procedure would be as follows: A record will be introduced into a sound-reproducing apparatus and the index-scale 9, if it be a detachable one, adjusted thereto and the operation of the apparatus commenced. As each sound or word or phrase or other succession of words is spoken by the instrument the position of the stylus with relation to the engraving on the record and the indicia on the scale is observed in any suitable way, as by means of the edge of the speaker-arm 2, and the sound or word or phrase or other succession of words are written down, and an indicia character corresponding with that on the index-scale with which the edge of the speaker-arm registers as the sound, word, phrase, or succession of words is enunciated is placed in front of or in other suitable relation thereto, and the number of the cylinder is also noted, as indicated at 16 and *a* in Fig. 6 of the drawings, and the guide 15, whether it be a textbook or lesson-book or lexicon or dictionary or of other character, may be compiled or arranged from this data. There will thus be had a guide for each cylinder having the sounds or words contained on the cylinder and in the same relation and having arranged in connection therewith indicia corresponding to that on the index-scale, so that at any time the student may desire to hear repeated clearly and distinctly, for instance, the French word “*parler*” he will see from the guide that said word is on cylinder No. 7 and at point “h,” and having this knowledge he can quickly introduce cylinder No. 7 into the phonographic

apparatus and adjust the stylus at a point on the record corresponding to point "h" on the index-scale, and the instrument will speak the word "*parler*" quickly and without running over the entire engraving on the record, as was necessary prior to my invention.

Having thus fully described the invention, what is claimed as new is—

1. A device for locating the position of matter engraved on the record of a sound-reproducing apparatus, consisting of a scale-index provided with indicia corresponding to indicia contained in a guide, and provided also with means whereby it may be adjustably connected to the apparatus.

2. A device for locating the position of matter engraved on the record of a sound-reproducing apparatus, consisting of a scale-index provided with indicia corresponding to indicia contained in a guide, and provided with means

whereby it may be detachably and adjustably connected to the apparatus.

3. A device for locating the position of matter engraved on the record of a sound-reproducing apparatus, consisting of a scale-index provided with a pointer and with indicia corresponding to indicia contained in a guide.

4. A device for locating the position of matter engraved on the record of a sound-reproducing apparatus, consisting of a scale-index provided with indicia corresponding to indicia contained in a guide provided with means for detachably connecting said scale-index to the apparatus, and provided also with a pointer.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

NELSON C. DURAND.

Witnesses:

DAVID COATE,
S. P. ALLE.





E. L. CRABB.
REPEATING ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED MAR. 17, 1905.

Fig. 1.

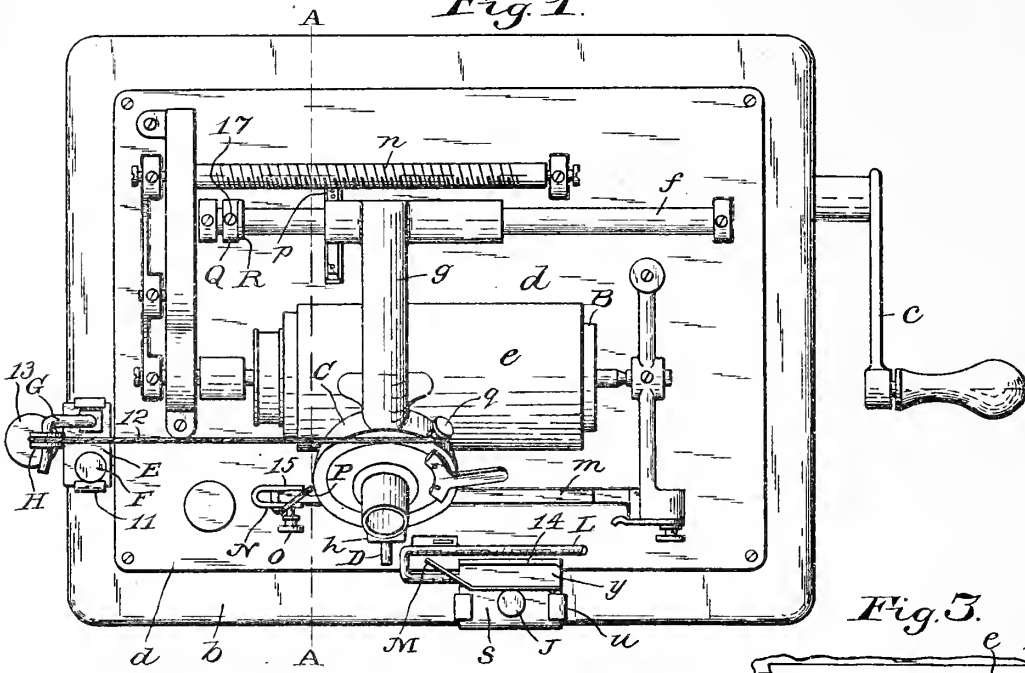


Fig. 3.

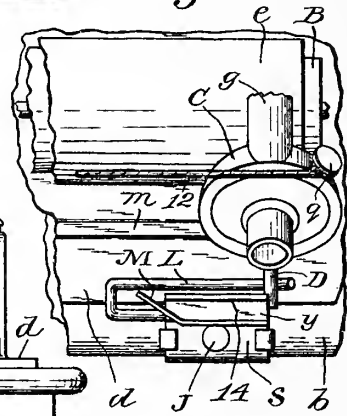
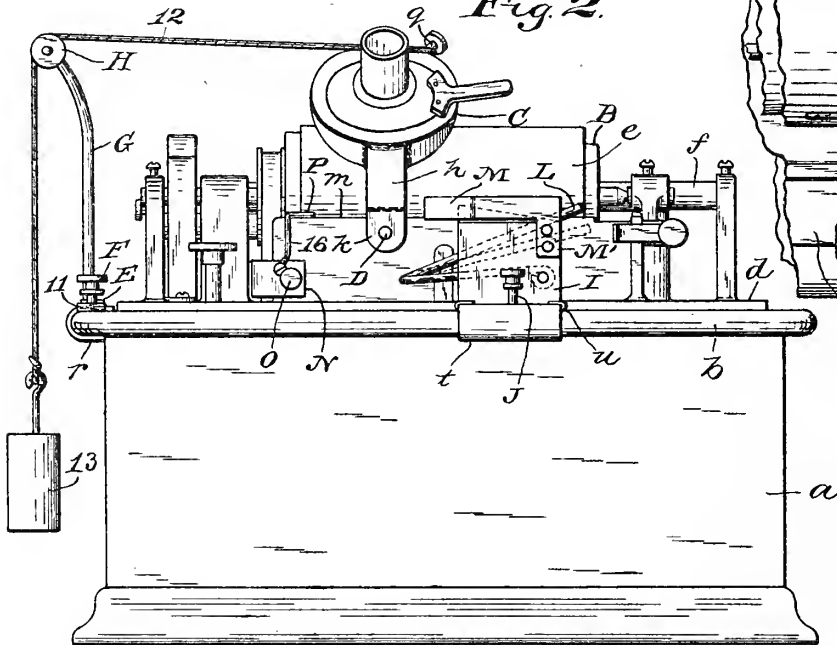


Fig. 2.



Inventor:

Earl L. Crabb.

by

C. T. Silvius,
Attorney.

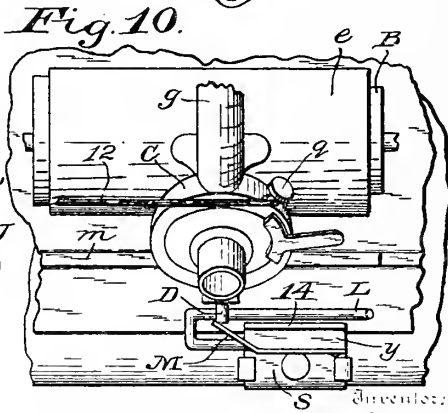
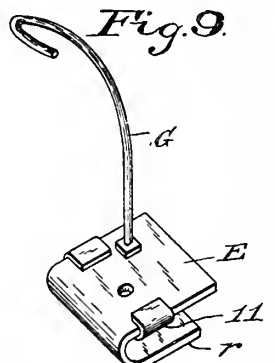
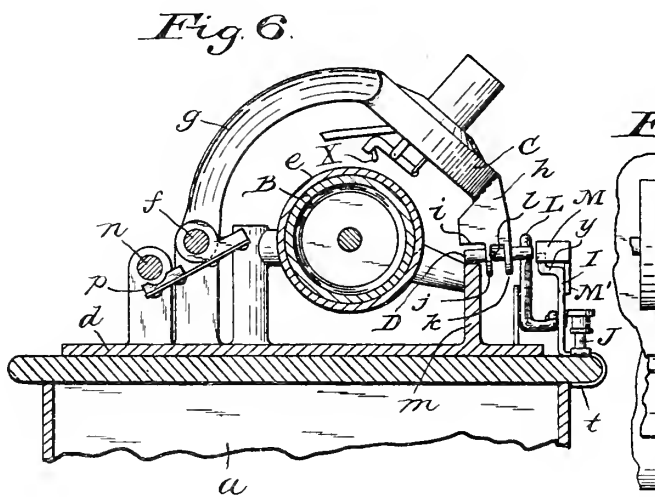
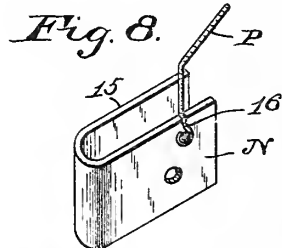
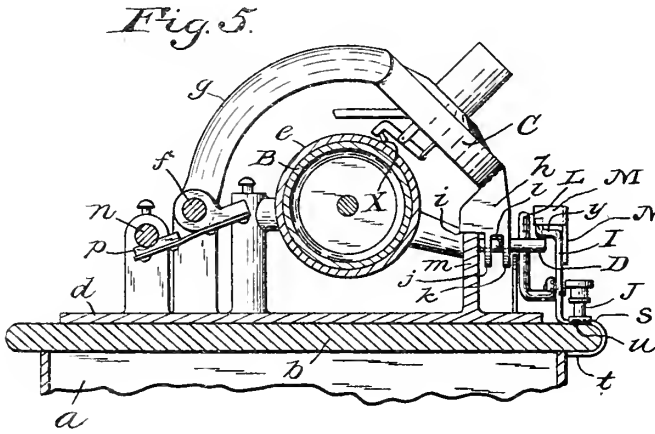
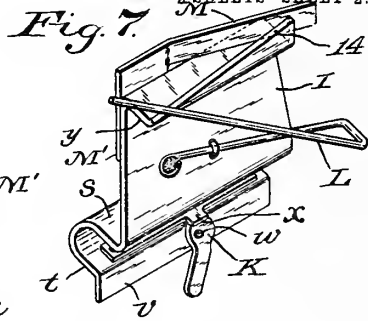
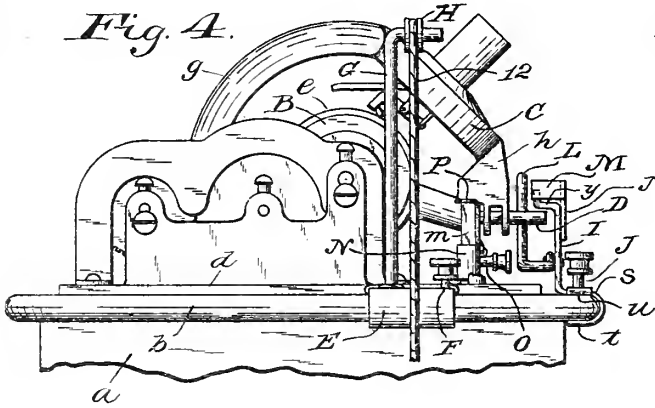
Witnesses.

E. R. Martin.
Stella Snider.



E. L. CRABB.
REPEATING ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED MAR. 17, 1905.

2 SHEETS—SHEET 2.



Witnesses:
E. J. Martin.
Stella Snider.

Inventor:
Earl L. Crabb.
by
E. J. Silvers.
Attorney.

UNITED STATES PATENT OFFICE.

EARL LEON CRABB, OF INDIANAPOLIS, INDIANA.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 794,786, dated July 18, 1905.

Application filed March 17, 1905. Serial No. 250,501.

To all whom it may concern:

Be it known that I, EARL LEON CRABB, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Repeating Attachments for Phonographs, &c.; and I do declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to machines of various styles having the characteristics of phonographs for reproducing sounds; and the invention has reference particularly to attachments that are adapted to be connected to the machines for the purpose of enabling them to automatically repeat what the records thereon may contain.

Objects of the invention are to provide repeating attachments for phonographs, &c., that may be applied to the machines by the users thereof, as well as by the various phonograph dealers, and which attachments may be quickly removed from the machines when not wanted for use.

A further object is to provide repeating attachments adapted to be connected to phonographs without requiring alterations or machine-work on the phonographs in order to accommodate the attachments; and a still further object is to provide attachments which with slight modifications may be adapted to be constructed as permanent parts of the phonographs.

The invention consists in a phonograph attachment comprising improved apparatus for elevating the reproducer-arm of the machine from its guide and moving a movable device carried by the arm upon the guide of the arm for holding the arm from the guide, in an improved device for withdrawing the movable device from the guide of the arm and in improved apparatus for returning the reproducer from the terminal end of the machine to the starting-point thereof; and the invention consists, further, in the novel parts and in the combinations and arrangements

of parts, as hereinafter particularly described and claimed.

Referring to the drawings, Figure 1 is a top plan of a phonograph having the improvement applied thereto; Fig. 2, a front elevation of the machine and the improvement connected therewith; Fig. 3, a fragmentary top plan showing a part of the improvement in connection with a part of the phonograph; Fig. 4, an end elevation of the upper parts of the phonograph and the improvement connected therewith; Fig. 5, a transverse sectional view of the upper parts of the phonograph and parts of the improvement connected therewith on the line A A in Fig. 1; Fig. 6, a view similar to Fig. 5, except that the reproducer and connections are elevated, as when returning in order to repeat the record; Fig. 7, a rear perspective view of one of the several parts of the attachment; Fig. 8, a perspective view of another one of the parts of the attachment; Fig. 9, a perspective view of the main portion of still another one of the parts of the attachment; and Fig. 10, a fragmentary top plan showing parts of the phonograph and improvements in connection therewith, the reproducer of the machine being in a returning position.

Similar reference characters in the several figures of the drawings designate corresponding parts or features.

The repeating attachment is illustrated in connection with a popular type of phonograph, to which the attachment may be most conveniently connected, and the parts of the phonograph to which the improvements relate will be particularly referred to herein, it being understood that other parts of phonographs not pointed out are well known and need no description in the present case.

The phonograph shown herein comprises, as constructed and sold, a case *a* for the motor mechanism, and a lid *b*, covering the case *a* and extending beyond the sides and ends thereof. A crank *c* is provided for winding the motor-spring. On the top of the lid *b* a base *d* is secured thereto and supports a cylinder *B*, on which a record *e* is placed to be rotated thereby, the base also supporting a guide *f*, on which is slidingly mounted a re-

producer-arm *g*, carrying an integral head C as a part thereof, in which a reproducer is mounted, the latter being adapted to have a horn connected therewith. The arm *g* is provided with a controller comprising a head *h*, which is an integral part with the head C and part of the reproducer-arm, and having a shoulder *i* and lips *j* and *k* forward of the shoulder and extending below the plane thereof and supporting a pin which may slide forwardly and rearwardly, the pin as supplied with the machine having a head at the outer end thereof. In order to apply the present improvement, the pin with the head has been discarded and a plain guide-pin D without a head, comprising a part of the invention, has been substituted therefor and provided with a stop-pin *l* between the lips *j* and *k*. Other parts of the phonograph comprise a guide-bar *m*, that is attached to the base *d* for guiding the reproducer; a feed-screw *n*, mounted also on the base *d*; a nut *p*, carried by the base of the arm *g* and adapted to yieldingly engage the feed-screw, and a set-screw *q*, attached to the reproducer-head C for locking the reproducer therein.

A part of the invention comprises a base E, having a binding-screw F, (omitted in Fig. 9,) adapted to rest on the top of the lid *a* at the left-hand end thereof, the base having a lip *r* extending under the edge of the lid and also having a shoe 11 to protect the lid against the screw when the base is clamped fast to the lid, as it must be when used, as shown. A pillar G is attached to the base E and is curved so as to extend beyond the plane of the end of the lid, the top of the pillar being provided with a sheave H (not shown in Fig. 9) for guiding a cord 12, that is connected to the set-screw *q* and supports a weight 13 below the sheave, the weight causing the arm *g* to be drawn toward the left-hand end of the cylinder B when the feed-nut *p* is disconnected from the feed-screw *n*. If desired, however, in lieu of the weight and cord a coiled spring may be connected to the pillar G and to the screw *q*, as will be obvious.

In order to disconnect the feed-nut *p* from the feed-screw *n* for the purpose of returning the reproducer after it shall have traversed the record and also in order to place the inner end of the guide-pin D upon the guide bar *m*, so that the reproducer cannot drag on the record while returning, a double-acting device is provided for elevating the head *h* and also for pushing the pin D inward upon the guide-bar *m*, and it comprises a stand I, that is attached removably to the projecting front edge of the lid *a* nearly opposite to the smaller end of the cylinder B, the stand having a base *s* on the lid and a lip *t*, extending under the edge of the lid, and a suitable securing device, as a binding-screw J and shoe *u* therefor, or an eccentric K, mounted on a flange *v* of the lip *t* by means of a pivot *w*, the

eccentric provided with a shoe *x*, supported by the lip *t*. A bar-shape spring L is supported by the stand I in an inclined position near the rear side thereof, and the top of the stand is provided with a flange-guide *y*, extending toward the spring L. A supplemental guide 14 is secured to the flange-guide of the stand, and its top is inclined to the plane of the base of the stand and also oppositely to the spring L. A guide M is attached, by means of a shank *M'*, to the front of the stand I and extends obliquely beyond the more elevated end of the guide 14, and preferably it is slightly yielding, so as to compensate for inaccurate adjustment of the stand I on the lid *b*. The proper adjustment is such that when the pin D is drawn quite forward its outer end portion may engage the top of the spring L and the under side of the flange-guide *y* and then ride on the guide 14 and be pushed back by the guide M, so as to engage the top of the guide-bar *m* while the reproducer is returning to the starting-point.

In order to draw the pin D forward from engagement with the guide-bar *m*, and thus permit the shoulder *i* to descend sufficiently to insure engagement of the nut *p* with the screw *n*, a guide-base N, provided with a binding-screw O (not shown in Fig. 8) and having a lip 15, is secured removably to the left-hand end of the guide-bar *m*, the base N supporting a guide P, that has a stem 16 secured to the base, the guide P extending obliquely across the top of the guide-bar *m* in the path of the inner end of the pin D, so as to serve as a wedge-like guide to force the pin forwardly from the guide-bar *m* while carried by the head *h* in its returning movement.

A stop-collar Q is applied to the guide *f* and secured adjustably thereto by a screw 17, the collar being provided with a rubber cushion R to be engaged by the base of the arm *g* when returned forcibly by the weight 13 to the starting-point. The collar serves as a gage that may be adjusted along the guide *f* to suit different records the positions of which may vary on the cylinder B. Other suitable forms of gages and cushion-stops may, however, be obviously employed in case there is not sufficient space in some machines for the collar Q on the guide *f*.

It will be understood that the cord 12 (or a spring) may be connected to any other suitable part than the screw *q* to accomplish the same result herein described, the base E may be modified so as to be attached to the base *d*, the stand I may be adapted to be attached to the base *d* or to the guide-bar *m*, and the base N may be modified, if desired, so as to be suitably attached to the base *d*. Also the form of the guide P may be variously modified.

In case the head *h* of the reproducer-controller does not have the lips *j* and *k*, supporting the controller guide-pin D, which are ab-

sent in some phonograph instruments, the pin D will be connected to the head *h* by means of suitable attachable devices.

In practical use, all parts of the attachment having been placed in position on the machine, as described, the machine may be started in the customary manner, the shoulder *i* being placed upon the guide P or upon the guide-bar *m* and the contact-piece X in engagement with the record *e*. If the shoulder *i* be upon the guide P, it will drop onto the guide-bar *m* while the head *h* progresses toward the right-hand side of the machine. The record will be completed as usual. Figs. 1 and 2 indicate that the record has been partially traversed by the reproducer. A further advance of the reproducer would cause the outer end portion of the pin D to ride upon the spring L and also engage the under side of the flange-guide *y*, as in Fig. 5, the guide *y* preventing the premature elevation of the pin D by the spring L and causing the spring to be deflected somewhat, as indicated in dotted lines in Fig. 2. In Fig. 3 the pin D is shown as having advanced nearly to the end of the guide *y*, and after arriving at the end of the guide the spring L would force the pin D upwardly, and therewith the head *h* and its supports and connections, which movements would disconnect the nut *p* from the screw *n*, and simultaneously the weight 13 would draw the reproducer and its arm and connections toward the left-hand side of the machine, the pin D riding upon the guide 14 to its end, at which point the guide M would force the pin D inward, as in Fig. 10, so that its inner end would be above the guide-bar *m* and would descend thereto in its movement with its carrier, and then the return movement of the reproducer would continue with the guide-pin D upon the guide-bar *m*, as in Fig. 6, thus holding the contact-piece X from the record and the nut *p* clear of the screw *n*. Further return movements will bring the inner end of the pin D in contact with the guide P and will be forced thereby forwardly until disengaged from the top of the guide-bar *m*, when the head *h* will descend until stopped by the shoulder *i* upon the guide-bar *m*, the nut *p* at the same time being carried into engagement with the screw *n*, the cushion R stopping the return movement without jar. All parts being again in proper positions, the reproducer will again advance and repeat the record, and the repetitions will occur while the motor furnishes the necessary power. The guide-pin D may be manipulated by hand when required in case of the machine being used without repeating.

Having thus described the invention, what is claimed as new is—

1. A repeating attachment including a movable guide-pin, a stand provided with a

movable spring-pressed arm for elevating the pin, a guide for carrying the pin, and means for moving the pin.

2. A repeating attachment including a stand provided with a movable spring-pressed arm and having a flange-guide extending beyond the body thereof toward the arm, and a guide supported by the stand and extending obliquely above the flange-guide beyond an end thereof.

3. A repeating attachment for phonographs including a movable guide-pin carried by a part that is fixed to the reproducer-head of the instrument, movable means in the path of the pin serving by means of the pin to elevate the reproducer, a guide gaging the action of the movable means, a device for actuating the movable means, a guide receiving the pin after having been elevated by the movable means, and a guide in the path of the outer end of the elevated pin serving to move the pin longitudinally inward upon the reproducer guide-bar of the instrument.

4. A repeating attachment, for phonographs that have each a reproducer guide-bar, including a movable guide-pin carried by a part that is fixed to the reproducer-head of the instrument, means for elevating the pin above the plane of the top of the guide-bar, means for pushing the pin upon the top of the guide-bar, means for drawing the pin along the top of the guide-bar and returning the reproducer, and a fixed guide for returning the pin to its normal position and thereby enabling the reproducer to engage the record of the instrument.

5. A repeating attachment for phonographs including a portable pillar secured detachably to the lid of the phonograph-case and provided with means for automatically drawing the reproducer of the instrument toward the pillar, a portable stand secured detachably to the lid and provided with means for elevating the reproducer at the end of the record of the instrument, means for supporting the reproducer clear of the record while being drawn toward the pillar, and a portable base secured detachably to the reproducer guide-bar and provided with means cooperating to depress the reproducer to the record at the end of the return movement of the reproducer toward the pillar.

6. In a phonograph, the combination with a traveling reproducer-arm, and a fixed reproducer guide-bar normally guiding the reproducer-arm, of a spring-pressed movable arm for elevating the reproducer-arm, a supplemental guide for temporarily guiding the elevated reproducer-arm independently of the guide-bar, means for returning the reproducer-arm, movable means interposed between the guide-bar and the reproducer-arm cooperating to temporarily guide the reproducer-arm, and a guide arranged obliquely to

the guide-bar cooperating to remove the movable means from between the guide-bar and the reproducer-arm.

7. In a phonograph, the combination with the head of the reproducer-arm, the guide-pin movable in the head, and the reproducer guide-bar, of a supplemental guide situated in a plane above the plane of the guide-bar, means for elevating the guide-pin onto the supplemental guide, and a guide extending obliquely to the reproducer guide-bar for forcing the guide-pin from the supplemental guide onto the reproducer guide-bar.

8. In a phonograph, the combination with the head of the reproducer-arm, the guide-pin movable in the head, and the reproducer guide-bar normally guiding the head of the reproducer-arm, of means for elevating and moving the guide-pin onto the reproducer guide-bar and lifting the head of the reproducer-arm from the guide-bar, a guide extending obliquely to the reproducer guide-bar for moving the guide-pin from the reproducer guide-bar and permitting the head of the reproducer-arm to descend to the reproducer guide-bar, and means for drawing the head of the reproducer-arm toward the obliquely-extending guide.

9. In a phonograph, the combination with the reproducer-arm, the guide-pin movable in the head of the reproducer-arm, and the reproducer guide-bar normally guiding the reproducer-arm, of means for elevating and moving the guide-pin onto the reproducer guide-bar and lifting the head of the reproducer-arm from the guide-bar, a guide extending obliquely to the reproducer guide-bar for moving the guide-pin from the guide-bar and permitting the head of the reproducer-arm to descend to the guide-bar, a pillar, and means connected to the reproducer-arm cooperating with the pillar and normally drawing the head of the reproducer-arm toward the obliquely-extending guide and forcibly into contact therewith.

10. In a phonograph, the combination with the case-lid, the reproducer-arm mounted above the lid, the guide-pin movable in the reproducer-arm head, and the reproducer guide-bar mounted above the lid and normally guiding the reproducer-arm, of a repeating attachment comprising a pillar secured detachably to the edge of the lid and provided with a sheave, a cord connected to the reproducer-arm and extending over the sheave, a weight attached to the cord, a stand secured detachably to the edge of the lid and provided with a spring-pressed arm in the path of the guide-pin and provided also with a supplemental guide and a guide disposed obliquely to the reproducer guide-bar, and a base secured detachably to the reproducer guide-bar and provided with a guide extending obliquely to the guide-bar in the path of the guide-pin.

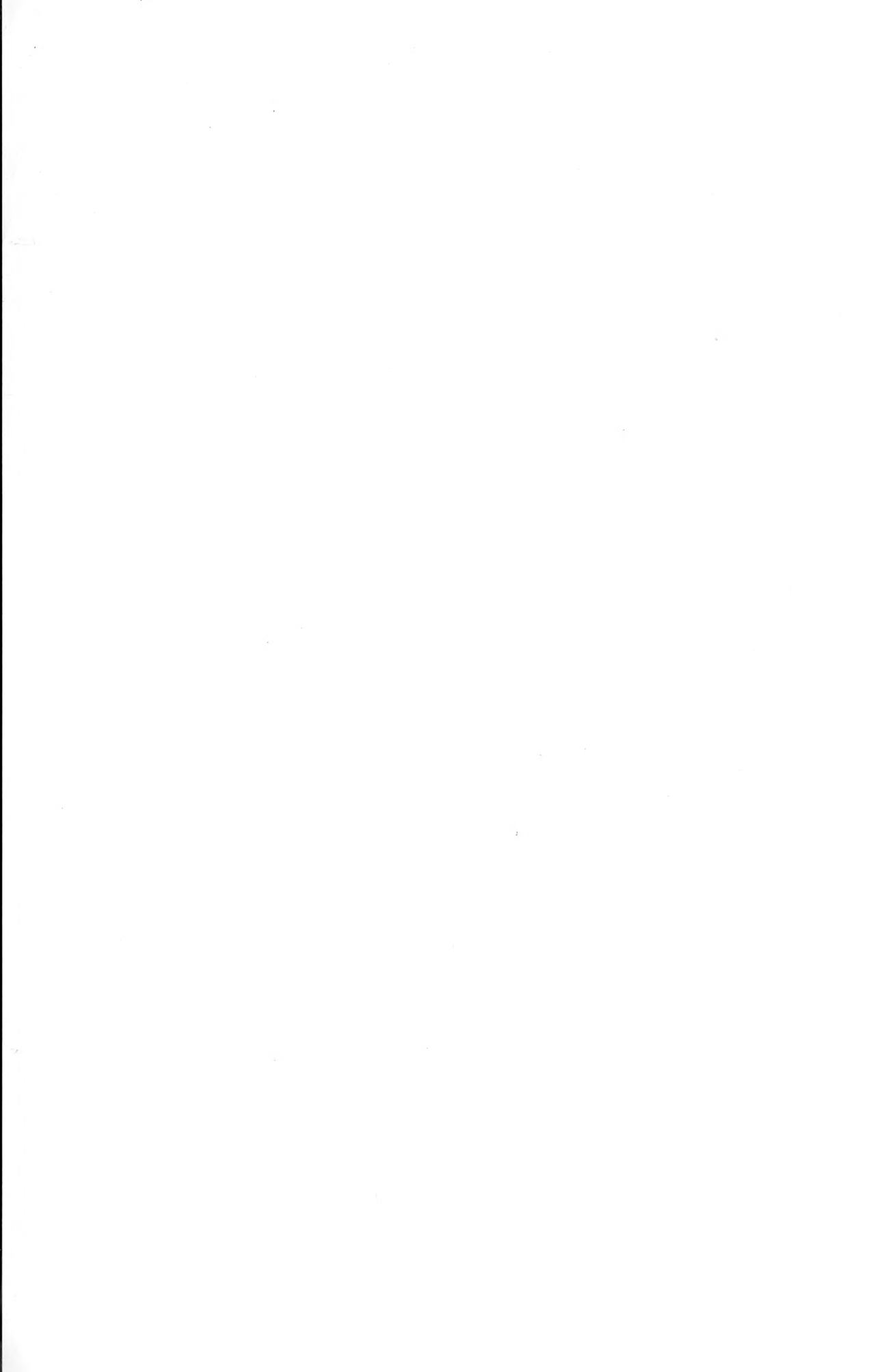
11. In a phonograph, the combination with a reproducer-arm carrying a reproducer, a guide-bar on which the reproducer-arm is guided in operation, means for moving the reproducer-arm on the guide-bar in one direction, means for moving the reproducer-arm in an opposite direction, and a movable device mounted on the reproducer-arm, of a support secured detachably to a suitable part of the phonograph, means mounted on the support cooperating to automatically place the movable device between the guide-bar and the reproducer-arm, automatic means cooperating to displace the movable device from between the guide-bar and the reproducer-arm, and a support for the automatic means secured detachably to a suitable part of the phonograph.

In testimony whereof I affix my signature in presence of two witnesses.

EARL LEON CRABB.

Witnesses:

WM. H. PAYNE,
E. T. SILVIUS.



T. H. MACDONALD.
SOUND REPRODUCER.
APPLICATION FILED DEC. 31, 1903.

FIG. 1.

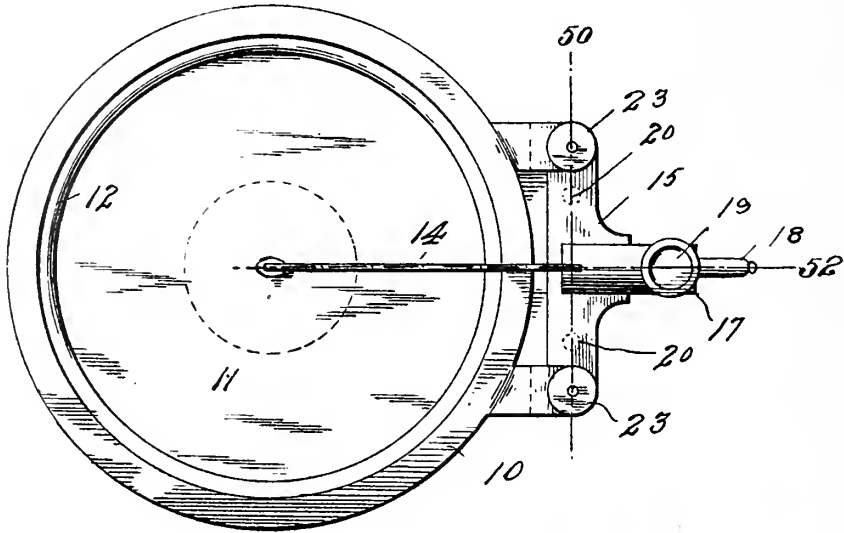


FIG. 2.

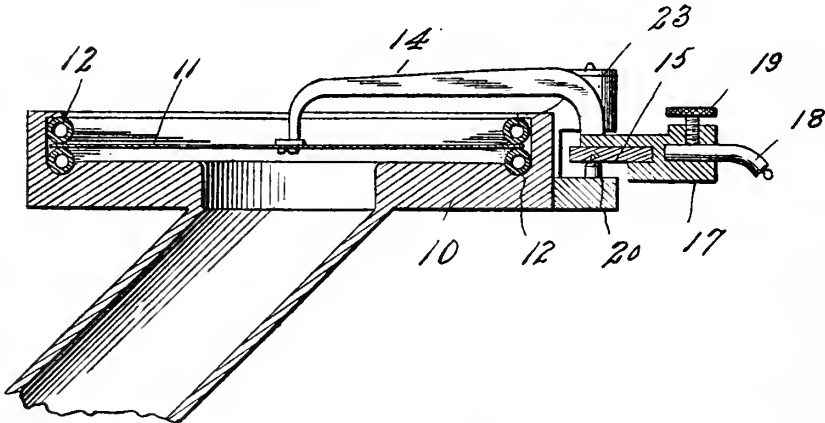
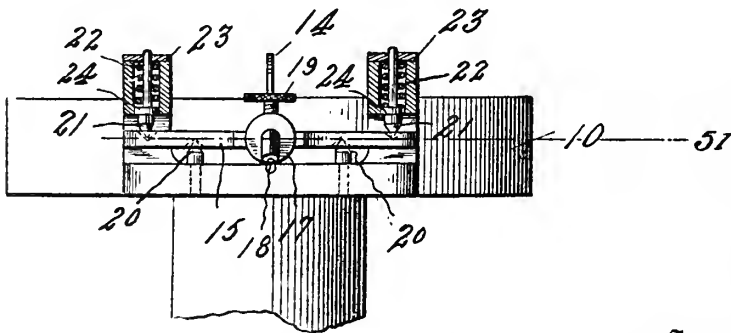


FIG. 3.



Witnesses

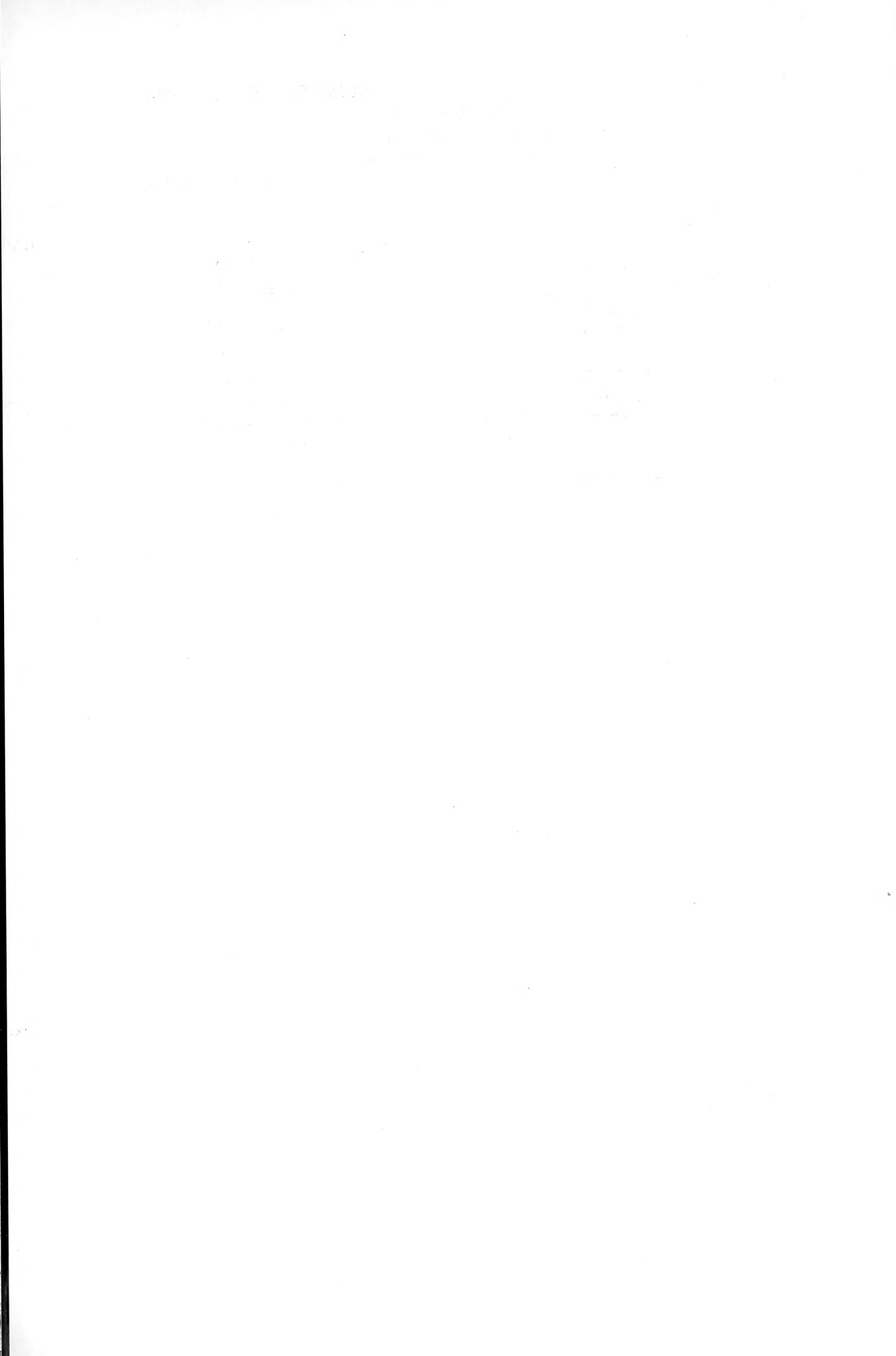
Chas. K. Davis.

Wm. B. Kerrow

Inventor
Thomas H. Macdonald

Charles Cameron Lewis Macmillan
611

Attorneys



T. H. MACDONALD.
SOUND REPRODUCER.

APPLICATION FILED DEC. 31, 1903.

2 SHEETS—SHEET 2.

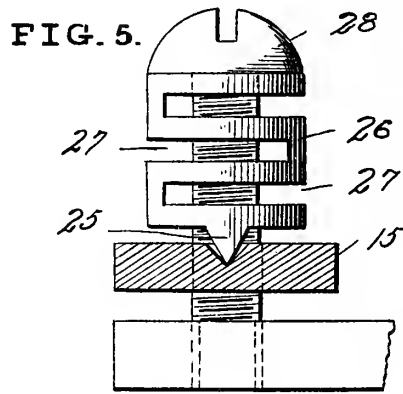
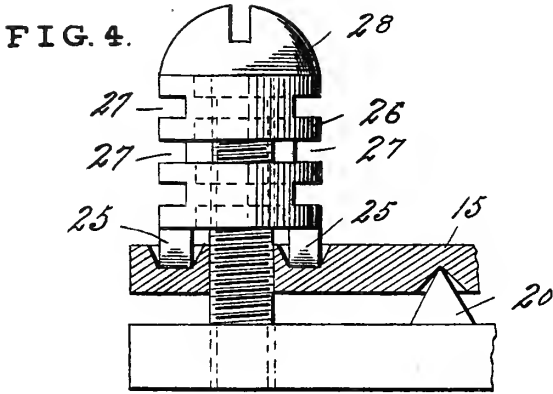


FIG. 6.

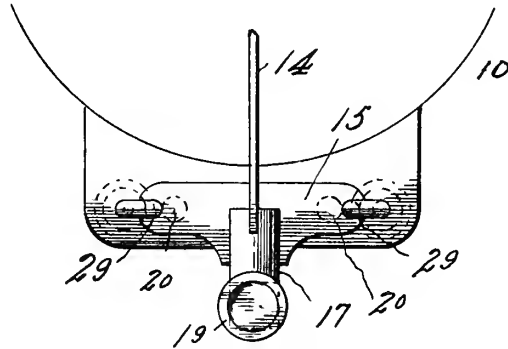
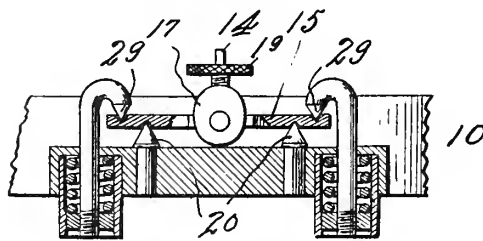


FIG. 7.



Witnesses

Chas. K. Davis.

[Signature]

Inventor

Thomas H. Macdonald

Lawrence Lewis Masie
by

Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SOUND-REPRODUCER.

No. 795,293.

Specification of Letters Patent.

Patented July 25, 1905.

Application filed December 31, 1903. Serial No. 187,296.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in Sound-Reproducers, which invention is fully set forth in the following specification.

This invention relates to sound-reproducers of the general form described in application filed April 17, 1903, Serial No. 153,143, wherein the stylus-carrying arm oscillates on pivot-points. These pivot-point reproducers are now used with "zigzag"—that is, laterally undulating—sound-records; but they are found also to give superior reproductions with records of varying depth.

In the application referred to above the invention is embodied in a reproducer whose stylus arm or support is fulcrumed on one side upon a knife-edge or pointed centers and on the other side upon coiled compression-springs. These springs can be made to press very firmly in the direction of their axes, while offering a very slight resistance to the oscillations of the diaphragm. This reproducer is therefore very responsive to the overtones, which give richness and quality to sounds.

One object of the present invention is to construct a reproducer wherein the pressure which holds the stylus-bar will be exerted entirely in the plane of its axis of oscillation. When spiral springs are brought to bear directly upon the rocker-bar, the spring-pressure extends to each side of the center of oscillation a distance equal to the radius of the spring. Although the resistance offered to oscillation in such construction is very slight, it is (in some cases, at least) advantageous to eliminate it.

In the accompanying drawings, Figure 1 is a plan view, Fig. 2 a longitudinal section, and Fig. 3 a cross-section, of a reproducer constructed in accordance with the invention. Figs. 4 and 5 are detail views in section at right angles to each other, illustrating a mode of pivoting the stylus-bar. Figs. 6 and 7 are details in plan and section, respectively, showing another mode of pivoting the stylus-bar.

The casing 10, diaphragm 11, gaskets 12, bar or lever 14, attached to the diaphragm, and rock-bar 15, which is virtually a part of bar or lever 14, and the continuation 17 of the bar or lever 14, having a socket for re-

ceiving the stylus 18, and a set-screw 19 for holding the stylus in place are or may be substantially as heretofore made and as described in my aforesaid application. The bar 15 is fulcrumed on one side upon the pivot-points 20, whose axes are at right angles to the diaphragm, as in my former application. On the other side the rock-bar is also fulcrumed upon pivot-points 21, these pivot-points being pressed toward the bar 15 by means of springs 22. The points 20 and 21 are all in the same plane, or, in other words, the axes of the pivot-points are all in the same plane, represented by the line 50, Fig. 1. Consequently the pressure is confined to the axis of oscillation of the bar or lever represented by line 51, Fig. 3, passing through all of the points. Furthermore, it follows that the bearings of points 20 and 21 are all in the same plane, which is transverse to the plane of oscillation of the stylus-bar. The plane of oscillation of the stylus-bar is represented by the line 52, Fig. 1. Inasmuch as the angle of these sockets is greater than that of the centers 20 21, the bearings are only on the extreme points, and the bar has freedom of oscillation within a limited but ample radius.

As shown in the drawings, the pivot-points 21 are supported in brackets 23, which are part of the frame of the reproducer, and the springs 22 are shown as coiled compression-springs, pressing at one end against the bracket 23 and at the other against a collar 24 on the pivot-points 21. These details are of course immaterial. The pivot-points 21 may be displaced against the pressure of the springs to remove the stylus-bar. In Figs. 4 and 5 another mode of applying the clamping-pressure is illustrated. The movable pivots 25 (in this case knife-edges, which are the equivalents of points, though points are preferred) are formed on a piece of steel tubing. In this tubing 26 are several saw-cuts 27, alternately from opposite sides, which give resilience longitudinally to the tube. A screw 28 presses the tubes or spring pivot-supports against the bar 15.

In Figs. 6 and 7 is shown a modification of the construction of Figs. 1, 2, and 3. The pivot-points 29 are in this instance hook-shaped, so that the shanks extend to the opposite side of the bar from the points. This

construction has the additional advantage that the pivot-supports, besides being movable, can be simply turned to one side, thereby releasing the stylus-bar.

In Figs. 1, 2, and 3 the stylus is shown as curved downward—that is, transversely to the plane of the diaphragm—this form being convenient for use with records of varying depth. A straight stylus can be inserted in the socket, and, indeed, no change in the reproducer is necessary to change it from one to the other form of record. It is necessary only to support it in that position relatively to the record in which it will operate most efficiently.

What is claimed is—

1. In a sound-reproducer, a stylus bar or lever fulcrumed on centers on both sides and firmly held between said centers, the axis of oscillation of the bar being transverse to the axes of the centers.

2. In a sound-reproducer, a stylus bar or lever fulcrumed on centers and held thereon by pressure exerted solely in the plane of the axes of said centers, the axis of oscillation of the bar being transverse to the axes of the centers.

3. In a sound-reproducer, a stylus bar or lever fulcrumed on centers whose axes are transverse to the axis of oscillation of said bar or lever, and held thereon by yielding pressure exerted solely in the plane of the axes of said centers.

4. In a sound-reproducer, a stylus-bar fulcrumed on one side upon fixed pivot-points and on the other upon removable pivot-points the axis of oscillation of the bar being transverse to the axes of the pivot-points.

5. The combination with the stylus-bar of a pivotal support therefor consisting of pivots on each side of the bar, the axes of said centers being all in the same plane and transverse to the axis of oscillation of said bar.

6. The combination with the stylus-bar of a pivotal support therefor consisting of pivots on each side of the bar, the bearing-points

of said pivots being all in the same plane transverse to their axes.

7. The combination with the stylus-bar of a pivotal support therefor consisting of pivots on each side of the bar, one or more of said pivots being integral with a support which is resilient lengthwise of the axes of the pivots.

8. The combination with the stylus-bar of a pivotal support therefor consisting of pivots on each side of the bar, one set of the pivots having hook-shaped shanks and being pressed against the bar by yielding pressure, so that they can be turned aside to release the bar.

9. In a sound-reproducer, the combination of a diaphragm, a stylus-bar attached at one end to the diaphragm, an antifriction-bearing upon which said bar is fulcrumed, means for holding the bar on its bearing with yielding pressure, and a stylus-carried by said bar and curved transversely to the diaphragm.

10. In a sound-reproducer, a stylus bar or lever fulcrumed on centers, and means for exerting pressure to tension said centers, said pressure being exerted solely in the plane of the axes of the centers, said plane being transverse to the plane of oscillation of said bar.

11. A sound-reproducer comprising a stylus-arm, a support, pivot-points between said arm and support, and tensioning means for exerting tension only in a plane of said pivot-points transverse to the axis of the stylus.

12. In a sound-reproducer, a stylus bar or lever mounted to oscillate upon antifriction-bearings, means for exerting spring-pressure solely in a plane of the axis of oscillation of said bar to tension said bearings, said plane being transverse to the plane of oscillation of said bar.

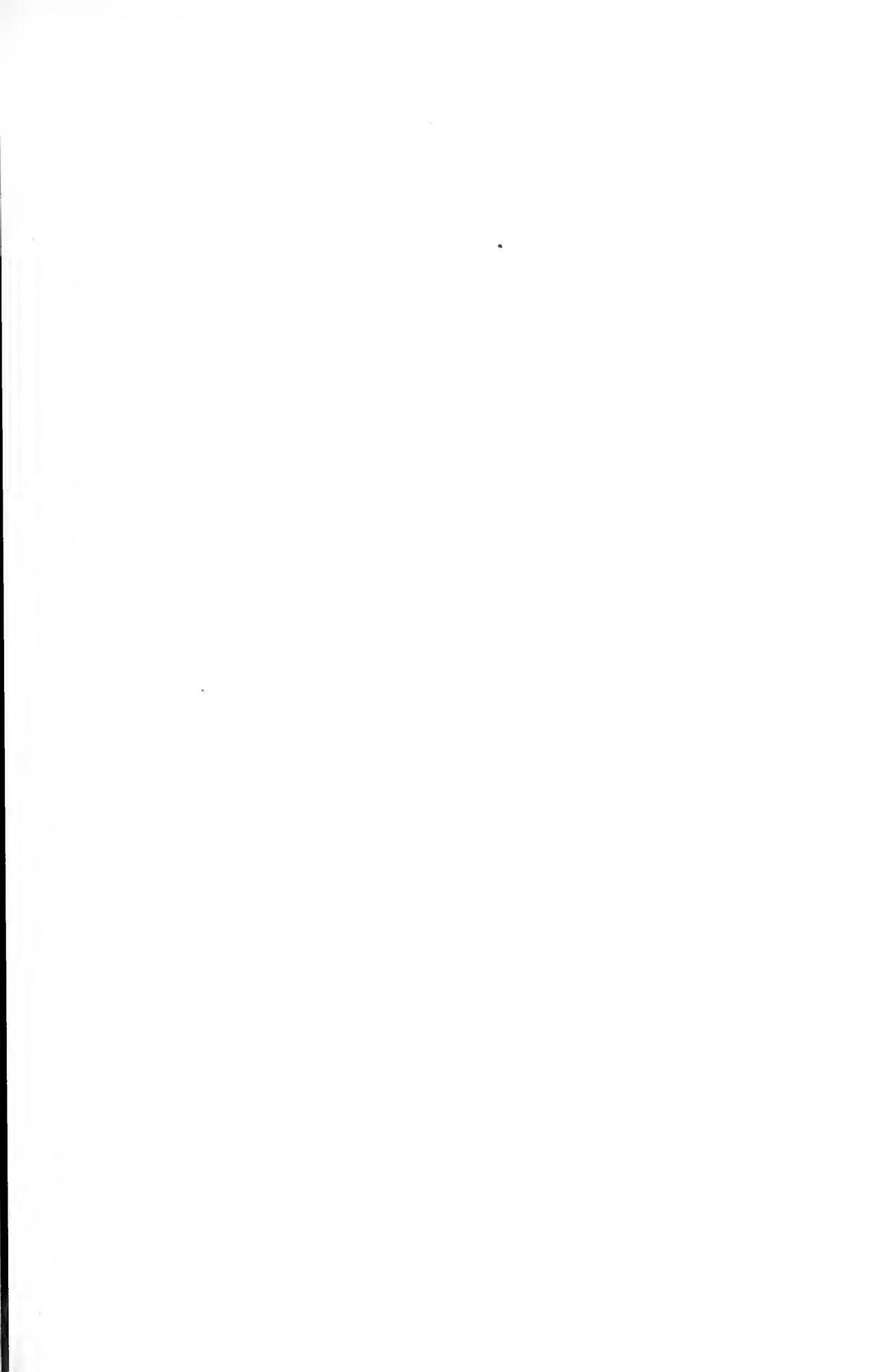
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,

C. A. GIBNER.

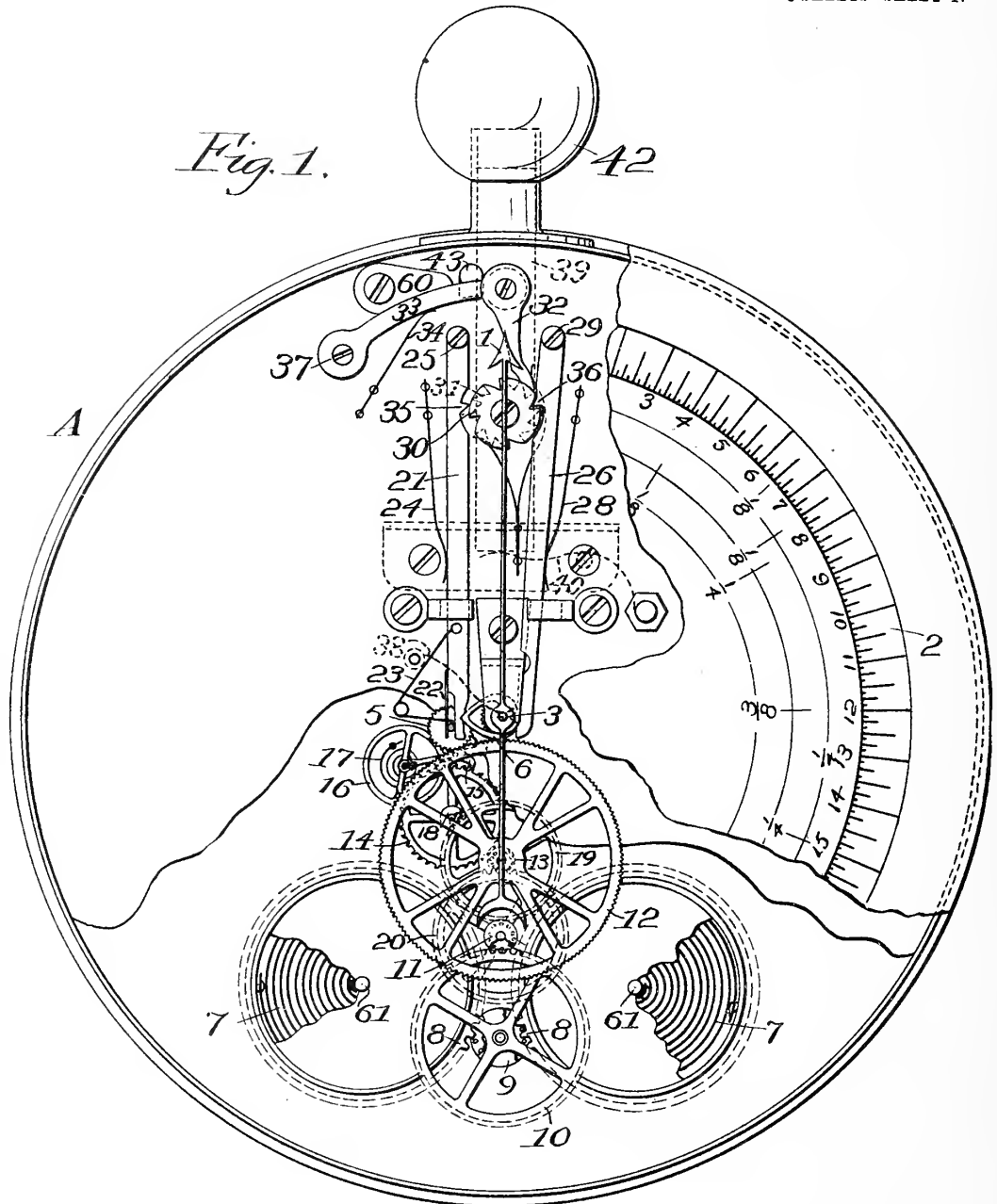


No. 796,540.

PATENTED AUG. 8, 1905.

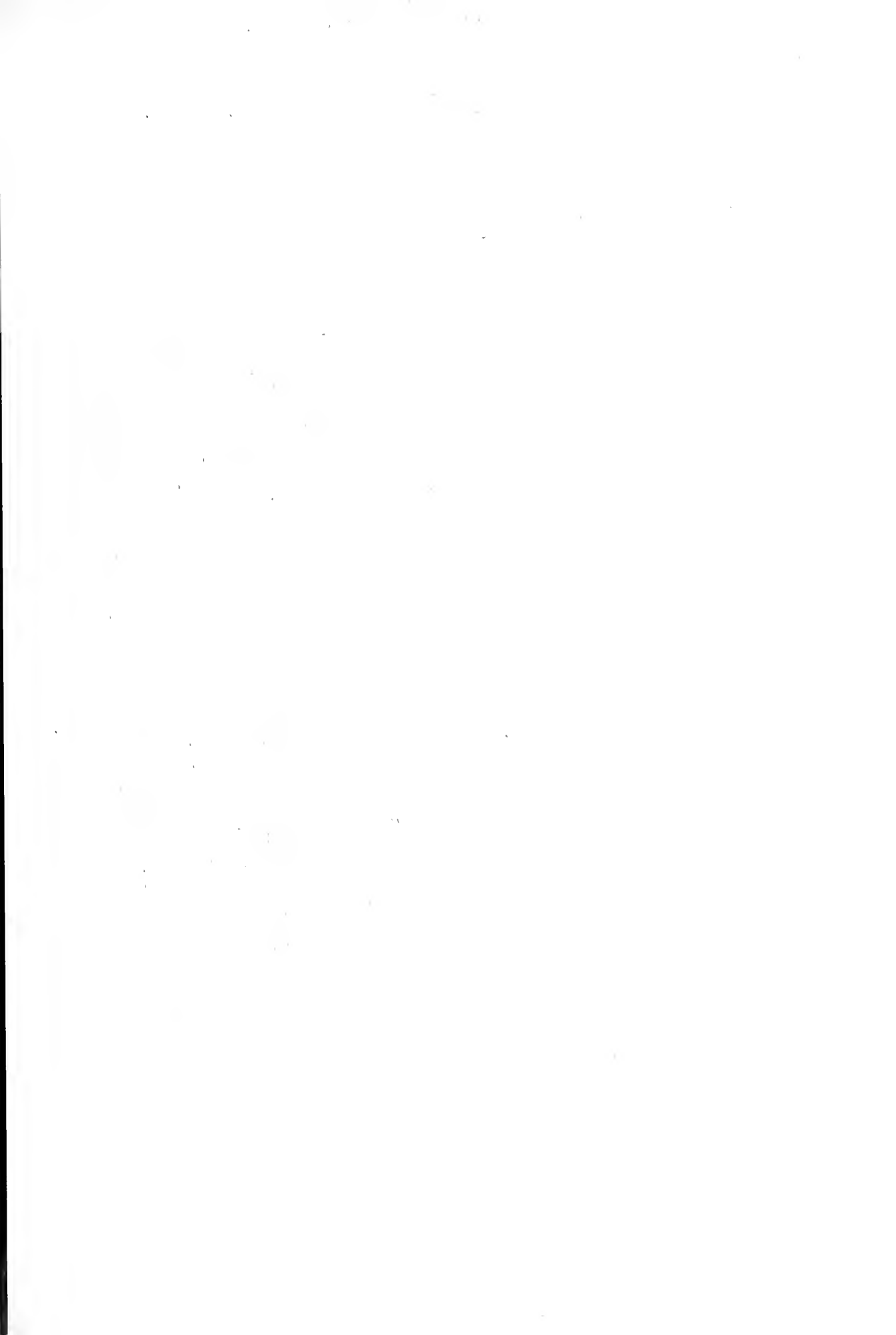
J. SUTHERLAND.
ECHO DISTANCE METER.
APPLICATION FILED NOV. 10, 1904.

3 SHEETS—SHEET 1.

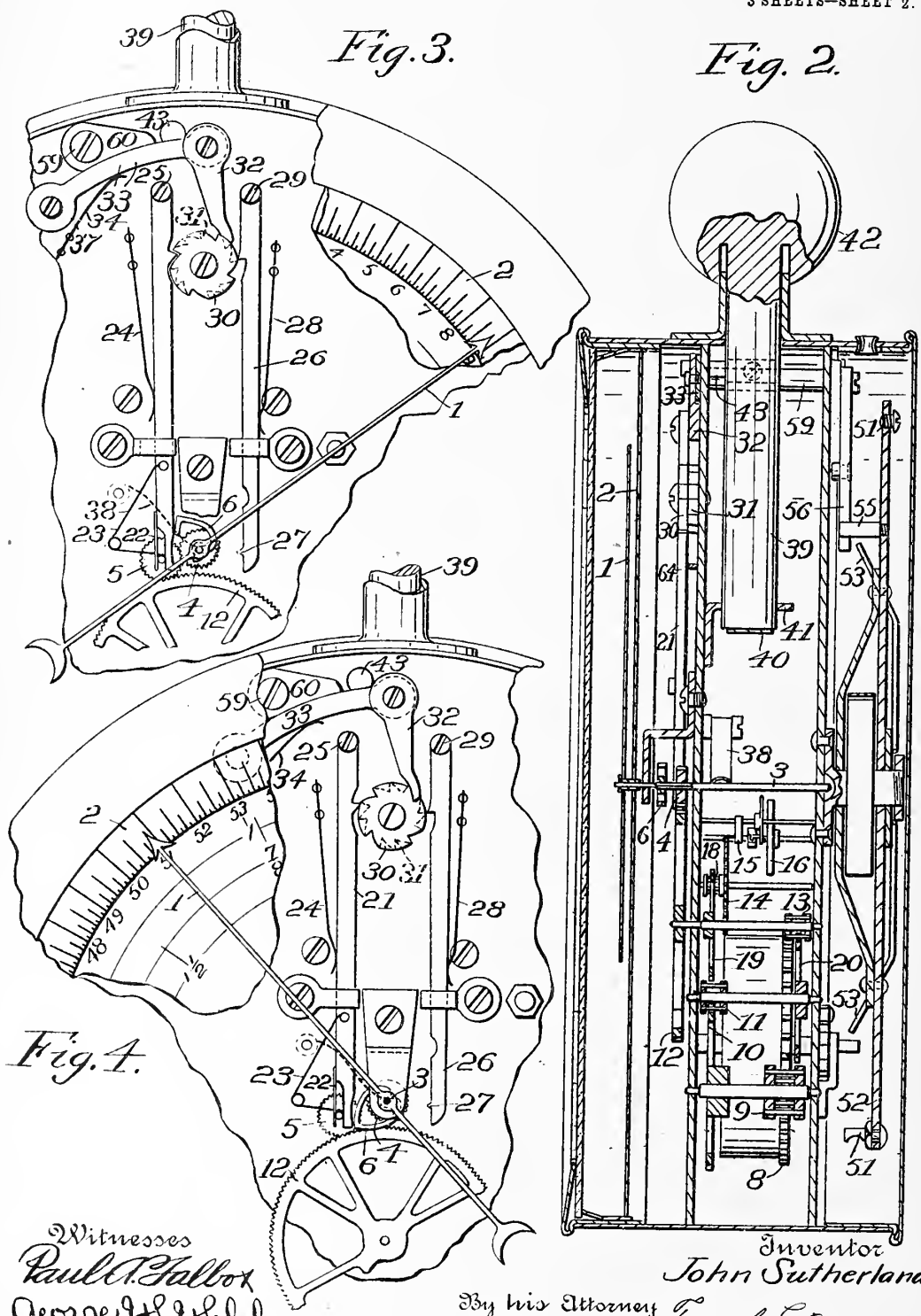


Witnesses
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George H. Welch.

Inventor
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By his Attorney
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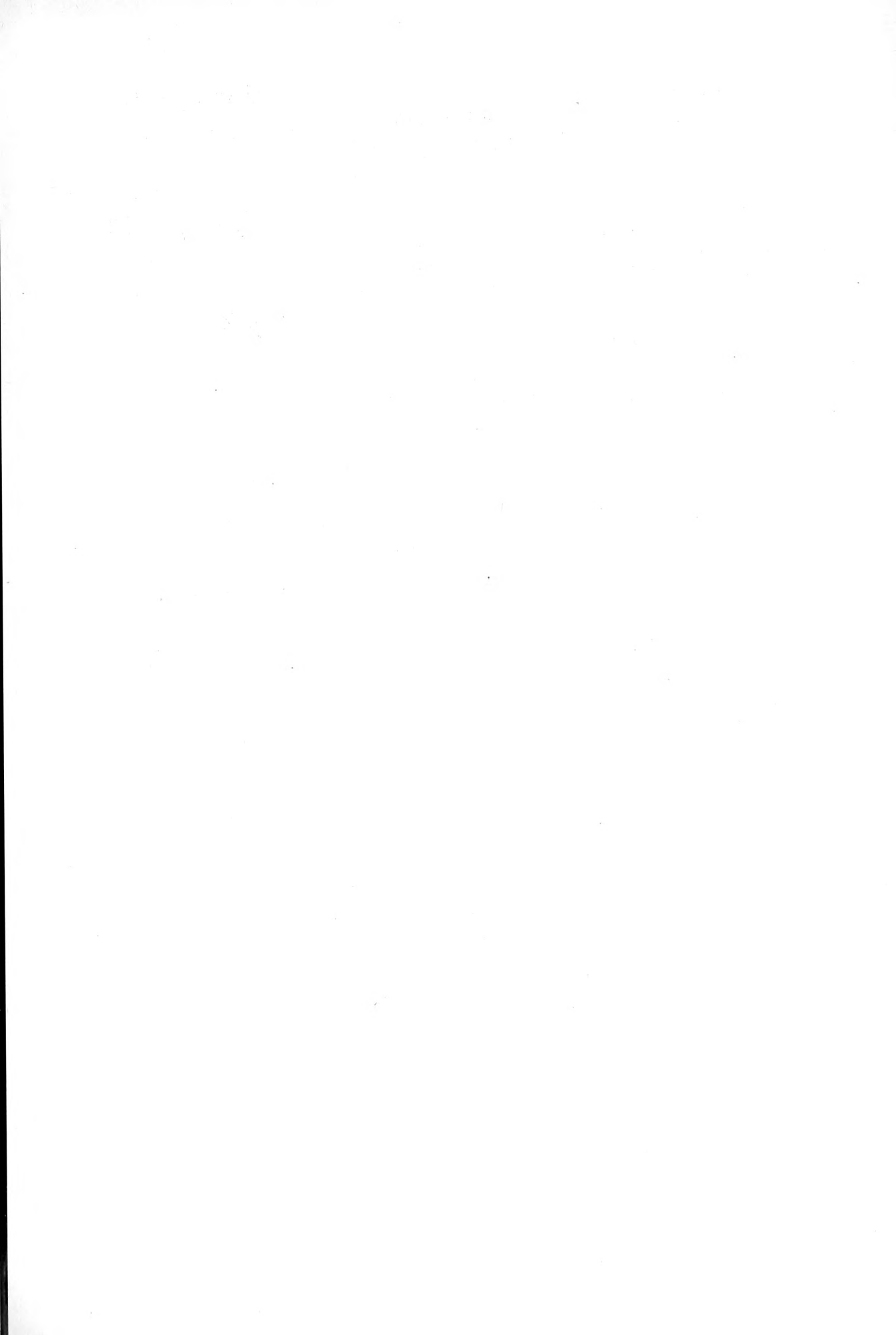


J. SUTHERLAND.
ECHO DISTANCE METER.
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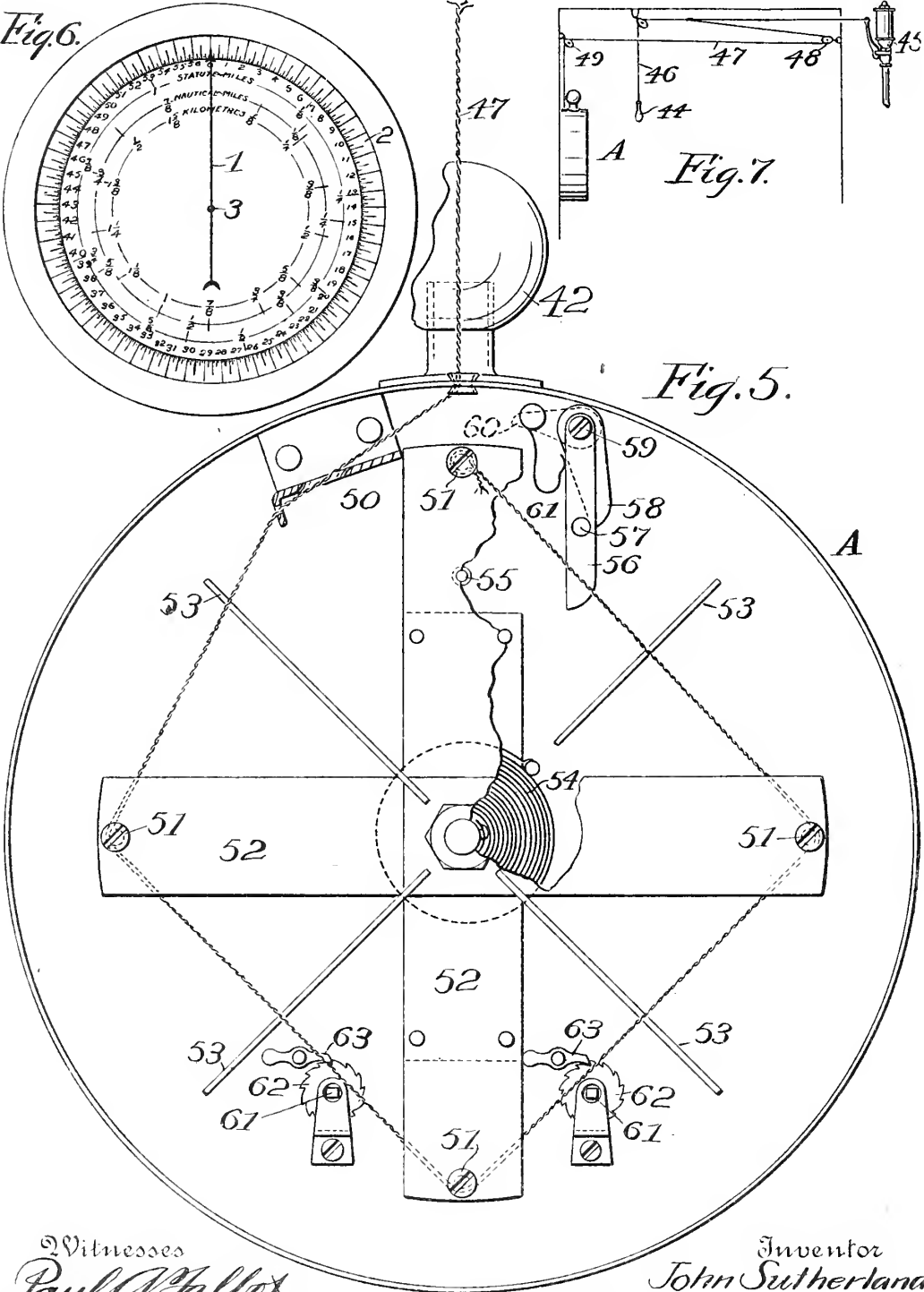
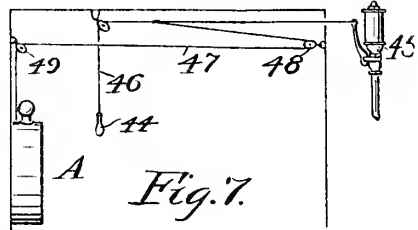
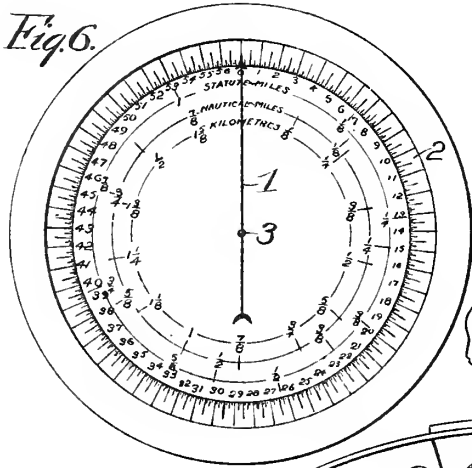
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J. SUTHERLAND.
ECHO DISTANCE METER.
APPLICATION FILED NOV. 10, 1904.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

JOHN SUTHERLAND, OF SEATTLE, WASHINGTON, ASSIGNOR TO SUTHERLAND STEAMSHIP ECHOMETER COMPANY, OF SEATTLE, WASHINGTON, A CORPORATION OF WASHINGTON.

ECHO-DISTANCE METER.

No. 796,540.

Specification of Letters Patent.

Patented Aug. 8, 1905.

Application filed November 10, 1904. Serial No. 232,204.

To all whom it may concern:

Be it known that I, JOHN SUTHERLAND, a citizen of the United States of America, and a resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Echo-Distance Meters, of which the following is a specification.

My invention relates to improvements in time-indicating mechanisms, whereby they may be employed to directly indicate the distance to any sound-reflecting or echo-producing surface. I have therefore called my invention an "echo-distance meter," as the time of its operation depends upon the production of a sound and the receipt of an echo thereof, the time elapsing between the two being, as is well known, determined by the distance to the sound-reflecting or echo-producing surface.

The object of my invention is the production of a device of this character which will indicate distances directly without necessity for any calculations.

My object is, further, to generally simplify and improve such devices.

The scope of my invention will be particularly pointed out in the claims.

In the drawings I have shown my invention embodied in the form which is now preferred by me.

Figure 1 is a face view of my device, parts of the frame and casing being broken away to clearly show the operating mechanism. Fig. 2 is a sectional view on a plane at right angles to that of Fig. 1, the parts being in the starting or zero position, or the same as Fig. 1. Fig. 3 is a face view of the principal operating parts in operating position. Fig. 4 is a similar view showing the parts in resetting position. Fig. 5 shows a means by which the starting of the indicating parts may be initiated by the same means as is employed to initiate the production of the sound. Fig. 6 is a face view of the dial or scale and the pointer or indicator. Fig. 7 shows diagrammatically the means by which the sound-producing mechanism and my echo-distance meter may be connected to be operated by the same act.

It has long been the custom of navigators to judge of their position when navigating along the coast or upon inside waters in a fog

or at night when visual indications were not available by frequently sounding their whistle and listening for an echo from the coast. The greater the distance to the coast or any object which would produce an echo the greater the time which would elapse before the echo would be heard. By this expedient it has been possible for a person of sufficient experience to judge approximately of the distance from the echoing surface. The accuracy of this estimate has always been uncertain and it required great experience to estimate the distance with any approximation to truth. By the use of my invention it is possible for any one to tell the distance to the echo-producing surface with great accuracy and without any calculation.

The operation of my invention depends upon the well-known fact that if the time consumed in the travel of sound between two points be known the distance between these points may be determined.

The principal feature of my invention consists in the combination of a timing mechanism, preferably a stop-timing mechanism, with a scale so proportioned to the timing mechanism that the distance corresponding to the time consumed in the travel of the sound one way may be read directly without any calculation.

The mechanism illustrated and which I will now describe is not the only mechanism which may be employed to carry out my invention, but it is the mechanism which is now preferred by me.

The indicator is a pointer or hand 1, mounted upon a shaft 3, and the scale is laid out on a dial-plate 2. This pointer-shaft 3 also carries a pinion 4 and a heart-cam 6. The timing mechanism may be of any suitable type. That shown is actuated by springs 7 through gears and pinions 8, 9, 10, 11, 20, 13, and 12. The shaft of wheel 12 carries gear 19, which meshes with pinion 18, secured to an escapement-wheel 14, which is controlled in its action by an escapement 15, balance-wheel 16, and spring 17. Wheel 12 meshes with a pinion 5, which is movable to engage with and be disengaged from the pinion 4, carried by the shaft 3 of the pointer 1.

Pinion 5 is carried by an arm 21, pivoted at 25, the pinion-shaft being held against the side of the arm by spring 22 and the pinion in yielding engagement with the wheel 12 by

spring 23. This permits the shifting of the pinion along the arm 21, which is necessitated by its shifting into and out of engagement with the pinion 4 on the pointer-shaft. It is evident that the shaft of pinion 5 may be mounted in a slot in arm 21. The arm 21 is held toward pinion 4 by spring 24.

Shaft 3 carries a heart-cam 6. An arm 26, pivoted at 29, has a tooth 27, adapted when pressed against the heart-cam to turn the cam and pointer back to the zero or initial position from any other position it may occupy. Spring 28 furnishes the actuating force for this work.

The position and action of levers 21 and 26 are controlled by a cam-wheel 30. This wheel is in the form of a disk with notches or teeth at intervals. A ratchet-wheel 31 is secured to wheel 30 and is engaged by pawl 32, carried by arm 33, pivoted at 37. Wheel 31 has three teeth to one tooth of wheel 30. Arms 21 and 26 have each a single tooth 35 and 36, respectively adapted to engage with the surface of wheel 30 and drop into its teeth. These teeth are so that in the normal or zero position, or that shown in Fig. 1, the tooth 36 on arm 26 lies in a tooth of wheel 30, the tooth 27 engaging the heart-cam to hold the pointer set in zero position and tooth 35 of arm 21 is out of the tooth in wheel 30, thus holding the pinion 5 of the timing mechanism out of engagement with the pinion 4 on the pointer-shaft. In the next position, or that of Fig. 3, tooth 35 drops into a tooth of wheel 30, thus moving the pinion 5 into engagement with pinion 4 and starting the movement of the pointer. At the same time tooth 36 is lifted out of the tooth in wheel 30, thus releasing the pointer-shaft to permit its turning. In the next position tooth 35 has been lifted out of the tooth in the wheel 30, thus separating pinions 4 and 5 and stopping the forward motion of pointer 1. A slight friction device, such as a spring 38, bearing upon the pointer-shaft or other member connected therewith, serves to hold the pointer in position where it is released. The next position is that first described. These successive positions are shown, respectively, in Figs. 1, 3, and 4. These positions are secured by single tooth advances of the toothed wheel 31, caused by depressions of the pawl-arm 33. This may be secured by various means. One means consists of a reciprocating plunger 39, which slides in a guide at one edge of the casing, and a guide-bracket 41 within the casing. This plunger is normally projected by a spring, as the flat spring 40. Outside the casing it is provided with a head 42, which is convenient for engagement by the hand for reciprocation of the plunger. Within the casing this plunger has a side projecting pin 43, which moves in the plane of the pawl lever or arm 33, so that when the plunger 39 is reciprocated the pin 43 swings the arm 33 downward, and with it

the pawl 32, thus actuating the ratchet-wheel 31, to thereby shift the position of the arms 21 and 26 and the parts controlled thereby. To complete the cycle of the parts, three reciprocations of the plunger 39 are required.

In addition to the plunger for operating the device I have provided a mechanism by which the starting of the pointer may be secured by the same act as that which produces the sound. How this may be done I have shown in Figs. 5 and 7. Fig. 7 shows the connections diagrammatically. A represents the echo-distance meter, and 45 the whistle, in this case chosen as the source of the sound which is to produce the echo. A cord 46 is provided with a handle 44, conveniently located to the hand of the operator. The cord 46 extends through suitable guides to the whistle-lever and is connected with a second cord or branch cord 47, which leads to the echo-meter through suitable guides, as 48 and 49. The cord or chain 47 leads within the casing of the device and through a guide, as 50, and then about the periphery of a pivoted wheel or reel-like device consisting of the arms 52 and 53 and the pins 51. The inner end of this cord is secured to the wheel, as by fastening it to one of the pins 51. When the cord is pulled, the wheel will be revolved, and the pin 55, which projects from the under side of the wheel in the position shown in Fig. 5, will be caused to engage the swinging arm 56. Arm 56 carries a pin 57, which engages the end of the arm 58 which is fixedly secured to the shaft 59, which carries an arm 60 upon its other end. Arm 60 is so placed as to engage the pawl lever or arm 33, so that when the arm 60 is thrown down it forces down the pawl-lever and its pawl and moves the ratchet-wheel 31 one tooth-space. This secures a synchronous operation of the whistle and the echo-distance meter. The stopping of the pointer must, however, be done by hand. The return of the wheel 52 to its normal position may be secured by the use of a spring 54, secured to its shaft. Upon the return of the wheel the pin 57 strikes the end of the arm 56 and swings it back. This arm is loosely pivoted upon the shaft 59 and can swing back freely without affecting the shaft or the arm 58. The pin 55 will therefore pass under and past the arm 56 without moving the shaft 59. There are of course many other ways by which the same result may be obtained. In Fig. 1 are shown the two shafts 61 upon which the two springs 7, which actuate the mechanism of my device, are mounted. These are provided with square ends, as is common in all forms of clock-gears, so that they may be readily engaged by a key to wind them up. They are also provided with ratchet-wheels 62 and pawls 63.

In Fig. 6 I have shown a form of dial which I prefer to use with my device. This dial has four scales upon its face, the outer one indi-

cating the seconds of elapsed time since the device was started; the next, the statute miles to the surface from which the sound was reflected; the next, the same distance in nautical miles, and the inner the distance in meters. In laying out these scales the distance must be half that corresponding to the time elapsed, as the sound travels outward and back, and the actual distance traversed by the sound is twice that to the sound-reflecting surface.

By use of my device it is possible for the navigator to tell with great accuracy the distance to any echo-producing surface at once and without making any calculations.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States of America, is—

1. An echo-distance meter, comprising a timing mechanism, a starting and a stopping mechanism, and a scale adapted to translate the indications of the timing mechanism directly into terms of distance to the sound-reflecting surface.

2. An echo-distance meter, comprising a timing mechanism, a starting and a stopping mechanism, a resetting mechanism, and a scale adapted to translate the indications of the timing mechanism directly into terms of distance to the sound-reflecting surface.

3. An echo-distance meter, comprising an indicator, means for operating said indicator at a regular time rate, means for starting and stopping said indicator at will and a scale adapted to translate the movement of said indicator into terms of distance to the sound-reflecting surface.

4. An echo-distance meter comprising an indicator, means for operating said indicator at a regular time rate, means for starting and stopping said indicator at will, means for resetting said indicator at zero, and a scale adapted to translate the movement of said indicator into terms of distance to the sound-reflecting surface.

5. An echo-distance meter, comprising a timing mechanism, means for producing a sound, means for starting the timing mechanism, a common actuating means for both said mechanisms, a stopping mechanism, and a scale adapted to translate the indications of the timing mechanism directly into terms of distance to the sound-reflecting surface.

6. An echo-distance meter comprising a stop-timing mechanism, and a scale adapted to translate the indications of said mechanism directly into terms of distance to the sound-reflecting surface.

7. An echo-distance meter comprising an indicator, a scale adapted to translate the indications directly into terms of distance to the sound-reflecting surface, and means for producing relative movement of said indicator and scale at a uniform rate and for the desired time.

8. An echo-distance meter comprising an indicator, a scale adapted to translate the indications directly into terms of distance to the sound-reflecting surface, and means for producing relative movement of said indicator and scale at a uniform rate and for the desired time, and means for setting said indicator and scale at zero.

9. An echo-distance meter comprising a stop-timing mechanism, a rotative member, means whereby the movement of said rotative member may be made to start the stop-timing mechanism, and means for connecting said rotative member with an operating member for a signaling device.

10. An echo-distance meter comprising a stop-timing mechanism, a signal-producing mechanism, and a common starting member for both said mechanisms.

11. An echo-distance meter comprising a stop-timing mechanism, a rotative member adapted to start said stop-timing mechanism, a signal-producing mechanism, and a cord connected with said rotative member and the signal-producing mechanism to start both mechanisms simultaneously.

12. An echo-distance meter comprising a stop-timing mechanism, a whistle, and a common member for starting both of said devices.

13. An echo-distance meter comprising a stop-timing mechanism, a whistle, and a common member for starting both of said devices and means for independently stopping the stop-timing mechanism.

Signed at Seattle, Washington, this 28th day of October, 1904.

JOHN SUTHERLAND.

Witnesses:

ERNEST B. HERALD,
WALTER C. MCKAY.





T. H. MACDONALD.
PHONIC APPARATUS.
APPLICATION FILED FEB. 15, 1905.

Fig. 6.

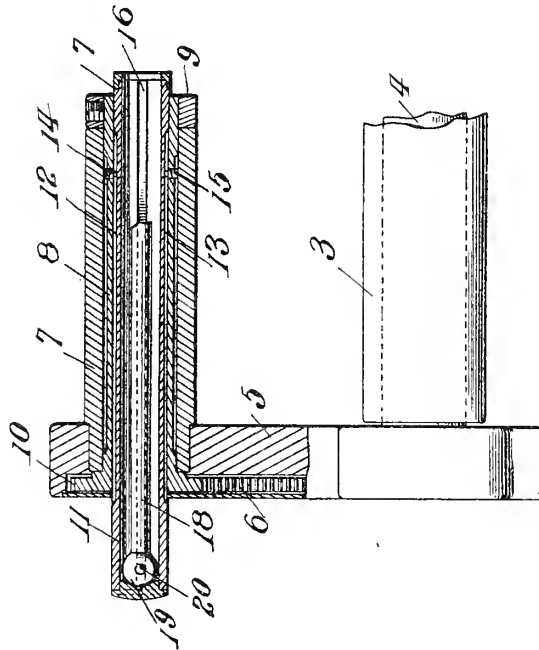
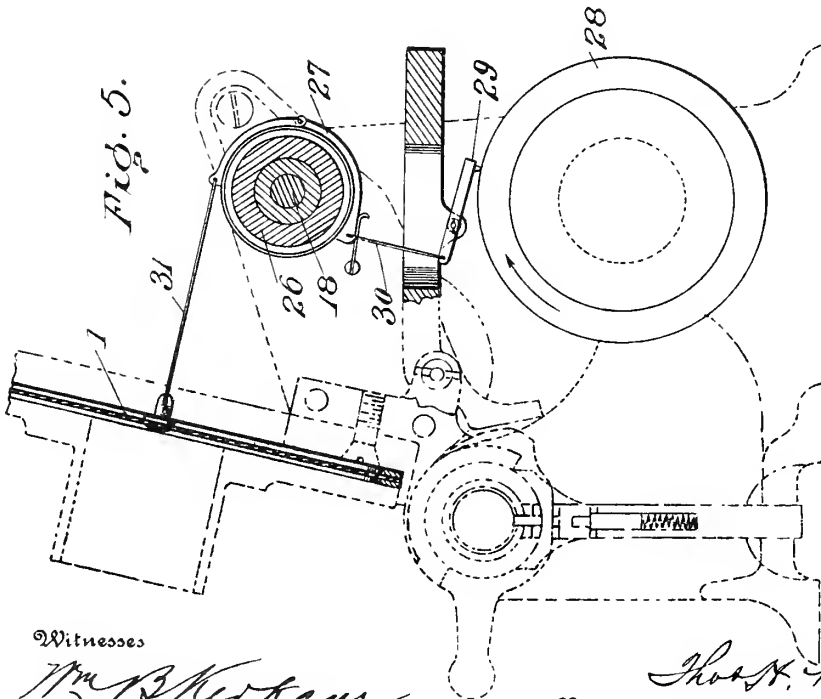


Fig. 5.

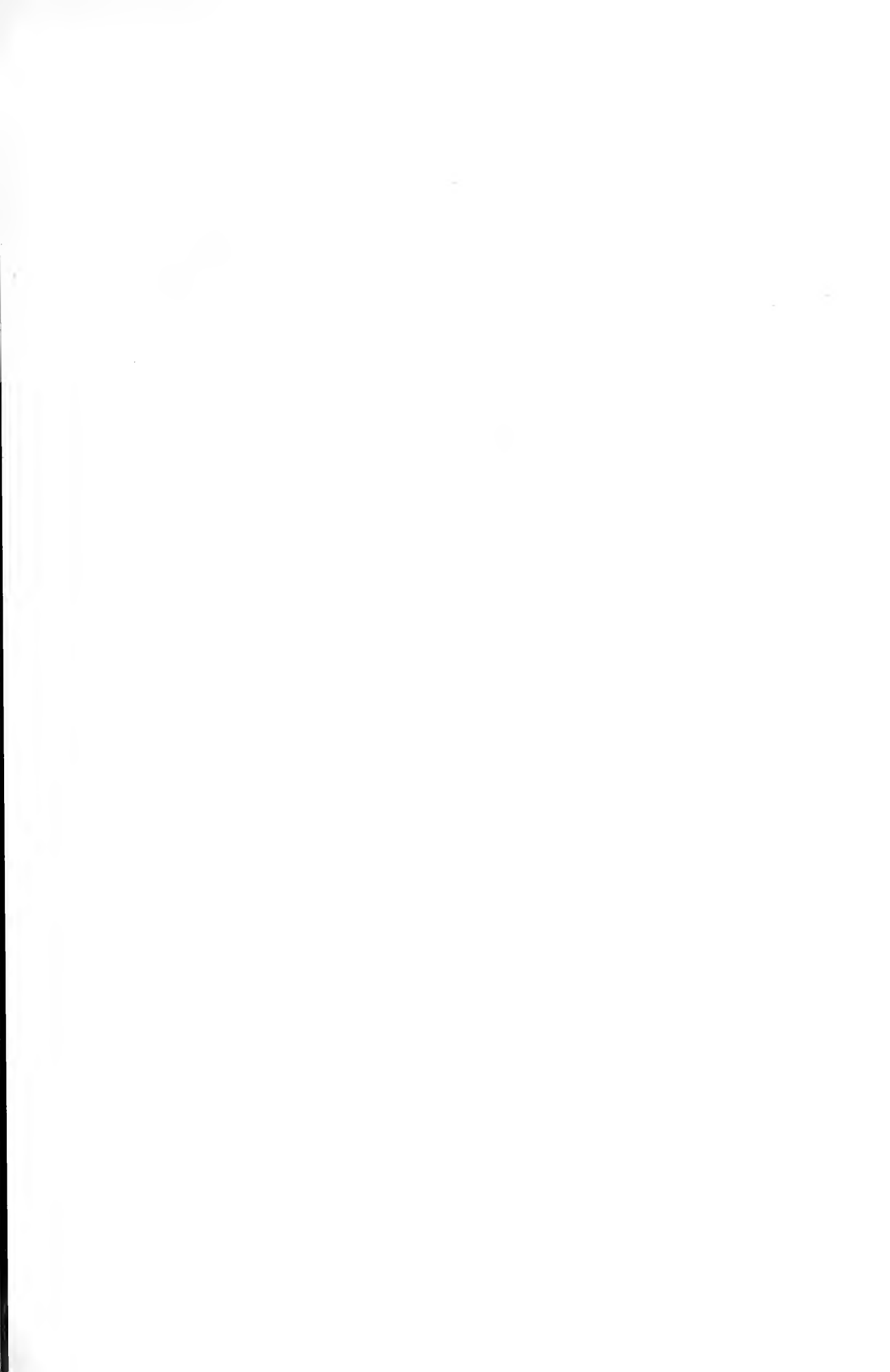


Inventor

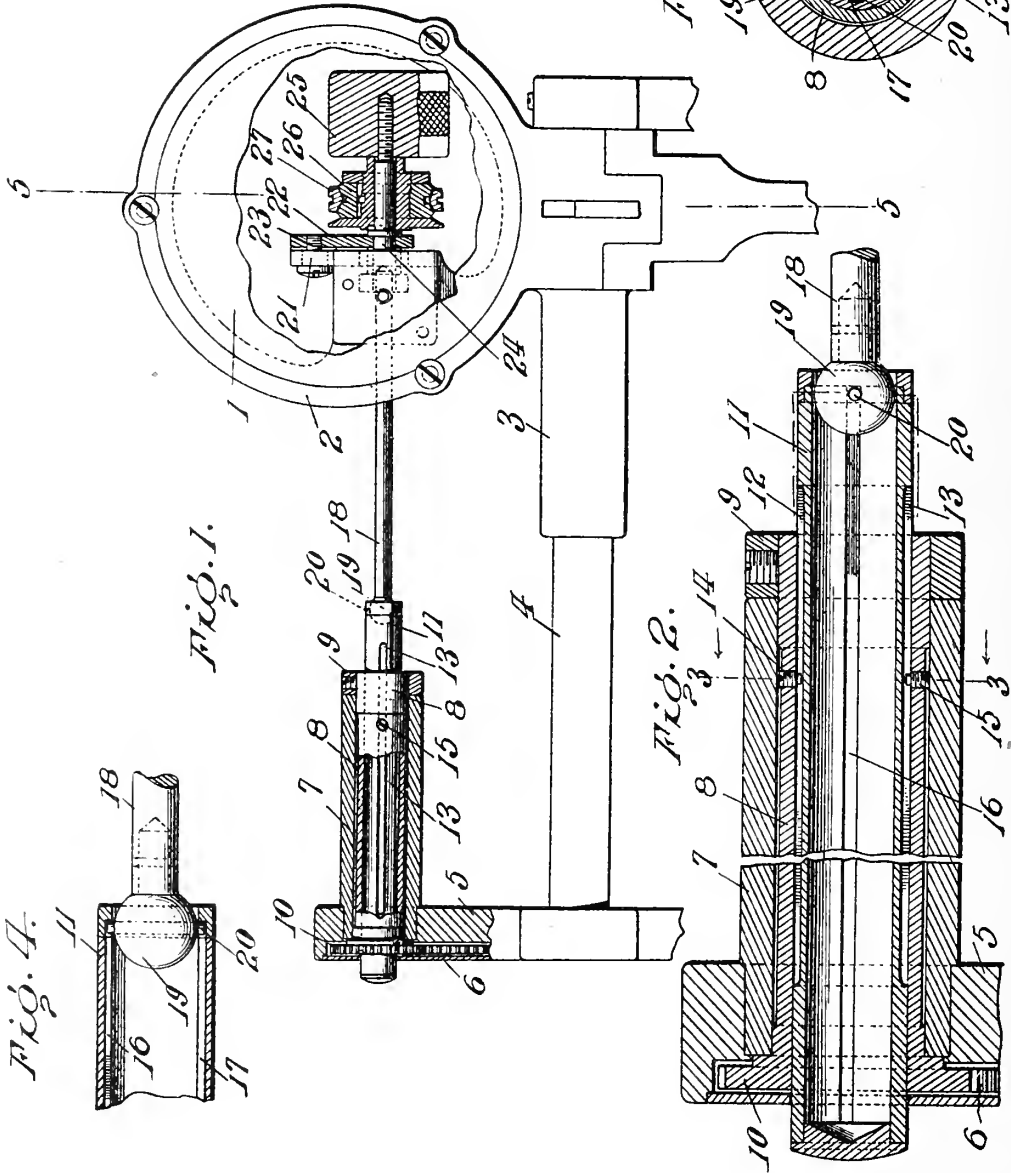
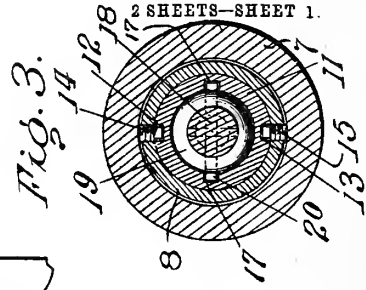
Witnesses

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Gustave R. Thompson.

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Attorneys



T. H. MACDONALD.
PHONIC APPARATUS.
APPLICATION FILED FEB. 15, 1905.



Witnesses
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Justus R. Thompson

Inventor
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 By
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UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

PHONIC APPARATUS.

No. 796,743.

Specification of Letters Patent.

Patented Aug. 8, 1905.

Application filed February 15, 1905. Serial No. 245,740.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in Phonic Apparatus, which invention is fully set forth in the following specification.

This invention relates to means for recording and reproducing sounds, and particularly to means of the kind wherein frictional force is employed to actuate a diaphragm or other secondary vibrating means, the sonorous vibrations being employed to modify such frictional force and to mold it, so to speak, into sound-waves. Apparatus of this type is described in United States Patent No. 678,566, granted July 16, 1901, to Daniel Higham, and in my pending United States application Serial No. 237,857, filed December 21, 1904.

The object of the present invention is to furnish mechanism for carrying out in a practical way the invention set forth in the patent to said Higham and constitutes an improvement upon the structure described and claimed in my aforesaid application.

The improvements constituting the invention will be understood from the following description and drawings accompanying this application, in which—

Figure 1 is a side elevation, partly in broken section, of so much of the apparatus as relates to the said improvements. Fig. 2 is an enlarged sectional view of a detail thereof. Fig. 3 is a cross-section on the line 3 3 of Fig. 2. Fig. 4 is a broken sectional detail. Fig. 5 is a transverse section on the line 5 5 of Fig. 1, showing in the dotted outlines some of the operating parts of the machine; and Fig. 6 is a sectional detail showing a different position of the parts from that shown in Figs. 1 and 2.

Referring to the drawings, 1 indicates a vibratory diaphragm, which may be a diaphragm either of a recorder or a reproducer, here shown as that of a reproducer. This diaphragm is mounted in the usual or any suitable way in the head 2, supported on the usual carriage 3, which carriage is capable of sliding motion from left to right, and vice versa, on the support 4, being propelled by a screw or any suitable means in the manner well understood by those familiar with talking-machines—such, for example, as the well-known graphophone.

5 is an arm projecting upward from the

framework of the machine and has mounted thereon gearing 6, whose function will be hereinafter explained.

Rigidly mounted on the arm 5 and projecting from the side thereof is a sleeve 7, within which is a sleeve 8 capable of rotation within the sleeve 7, but without any other movement relative thereto, the sleeve 8 being retained in position in sleeve 7 by means of a washer 9, secured to one end of said sleeve 7, and a gear-wheel 10, secured to the other end, as will be understood from an inspection of Fig. 2. Mounted within the revolving sleeve 8 is a third sleeve 11, which is free to revolve with sleeve 8 and also to slide longitudinally therethrough. The sleeve 11 is provided with two longitudinally-extending grooves 12 and 13, which are engaged by lugs or projections 14 and 15, here shown in the form of screws passing through the walls of the sleeve 8 and entering the grooves 12 and 13. On the interior of the sleeve 11 are formed grooves 16 and 17, extending longitudinally of the sleeve for nearly its entire length. A shaft 18, having an enlarged globular end 19, is flexibly secured to the interior of the sleeve 11 by a pin 20, passing through the globular end 19 of the shaft, the ends of the pin projecting outward beyond the globular portion of said shaft and engaging in grooves 16 and 17, as will be understood from an inspection of Figs. 2 and 3, the construction being such that the shaft may be turned in a vertical plane around or on the pin 20, and at the same time is capable of a longitudinal sliding motion within the sliding sleeve 11.

Mounted upon a part 21, supported by the carriage 3, (see Fig. 1.) is a stirrup 22, pivoted at 23 to the part 21, said stirrup 22 affording a swinging bearing, as at 24, for the shaft 18. Secured on the outer end of the shaft 18 is a weight 25, while a friction-roll 26 is secured to the outer end of the shaft adjacent to the weight 25, which roll is engaged by the friction-shoe 27, the stirrup-bearing for the shaft, the weight, the roll, and the shoe being substantially of the character shown and described in my aforesaid application.

Referring to Fig. 5, 28 is a suitable tablet having a sound-record formed thereon, and 29 is a stylus-bearing lever resting upon said tablet and connected by the link 30 to the

friction-shoe 27, which shoe is connected to the diaphragm 1 by a suitable link 31.

The construction of the whole is such that when the driving-sleeve 8 is propelled by the gearing 10 the sliding sleeve 11 is caused to revolve with it by reason of the engagement of the lugs 14 and 15 in the longitudinally-extending grooves 12 and 13 in said sleeve. The revolution of the sliding sleeve 11 imparts similar revolution to the shaft 18 by reason of the engagement of the ends of the pin 20 in the longitudinally-extending grooves 16 and 17 on the interior of the sliding sleeve 11. The sleeve 11, however, while being compelled to revolve with the sleeve 8 is free to slide longitudinally therethrough, and likewise the shaft 18, while being compelled to revolve with the sleeve 11, is free to telescope or slide longitudinally within said sleeve. By reference to Figs. 1 and 2, in which the carriage is shown at its extreme right-hand position, it will be seen that the shaft 18 projects outward for its entire length beyond the sliding sleeve 11 and that this latter sleeve projects outward from the revolving or driving sleeve 8. If now the carriage be returned from its right-hand to its left-hand position, the globular portion 19 of said shaft, together with the pin 20, will slide along through the sliding sleeve 11 until the globular portion 19 reaches the extreme left-hand portion of the sleeve, as shown in Fig. 6, when the shaft will engage the closed end of the sleeve and thence forth during the rest of the movement to the left both the shaft and the sleeve will slide together, the sliding sleeve 11 moving through the sliding sleeve 8 until the parts reach the position shown in Fig. 6. The parts being in this position, if the carriage is again placed in connection with the driving-screw and the other mechanism for propelling it from left to right along the support 4 and the driving-gear 6 placed in operation the driving-sleeve 8, sliding sleeve 11, and the shaft 18 will all revolve together, and the shaft 18 will be drawn from left to right through the sliding sleeve until it reaches the right-hand end of said sleeve, when, the pin 20 engaging the ends of the grooves 16 and 17 in said sleeve, it will pick up the sleeve 11, and the sleeve will then be caused to slide longitudinally through the driving-sleeve 8 to the position shown in Fig. 2. From a study of this operation it will be seen that the shaft 18, together with the weight 25 and the friction-roll 26, will all be free to rise or fall, as the case may be, moving around the joint formed by the globular portion 19 with the sliding sleeve 11 and that the weight of all of these parts upon the shoe 27 will remain constant no matter what the position of the carriage 3 on its support 4 may be.

It has been found that in the construction shown in my previous application where the bearing of the shaft within the driving-sleeve

has been a constantly-changing one, owing to the sliding of the shaft through the sleeve, the weight bearing upon the friction-shoe has been a constantly-varying quantity owing to the increase or decrease of the length of the shaft supporting the friction roll and weight. This gave a varying action to the friction device, which has been found undesirable. By the present construction, however, the weight bearing upon the friction-shoe is the same at all times, with the resulting improvement in the action of the parts.

In some cases the sliding sleeve 11, which forms the connection between the driving-sleeve 8 and the shaft 18, might be omitted, the shaft being flexibly connected so as to slide longitudinally within the driving-sleeve 8. In this case, however, the shaft when in the extreme left-hand position projects for a considerable distance to the left of the frame portion 5 of the machine, resulting in an inconvenient and unsightly appearance, whereas by the present construction the sliding sleeve 11 never projects but a very short distance to the left of the frame 5, this projecting position being shown in Fig. 6.

What is claimed is—

1. In a phonic apparatus, the combination of a primary and a secondary vibrating means with an intermediate friction means including a friction roll and shoe, a shaft carrying said roll, a carriage supporting the entire weight of said shaft and roll, and means for revolving said shaft.

2. In a phonic apparatus, the combination of a primary and a secondary vibrating means, an intermediate friction means including a friction roll and shoe, means for revolving said roll, and a carriage supporting said roll and the parts directly connected thereto, the weight of said roll and connected parts on said carriage being constant.

3. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction means including a friction roll and shoe, a shaft carrying said roll, a carriage supporting the entire weight of said roll and shaft and a sliding connection between said shaft and a stationary part of the machine.

4. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage, a shaft carrying said roll and having one bearing on said carriage, a revolving sleeve on a stationary part of the machine, with which sleeve said shaft turns and to which it is slidably and pivotally connected.

5. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage, a shaft carrying said roll and having one bearing on said carriage, a revolving

sleeve on a stationary part of the machine, longitudinally - extending grooves in said sleeve and lugs on said shaft engaging said grooves.

6. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage supporting one of said vibrating members, a shaft carrying said roll and having a swinging bearing on said carriage, a revolving sleeve on a stationary part of the machine, longitudinally - extending grooves in said sleeve and lugs on said shaft engaging said grooves.

7. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage, a revolving element carrying said roll and having a yielding bearing on said carriage, driving mechanism for revolving said element, and a jointed connection between said element and said driving mechanism.

8. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage, a bearing on a stationary part of the machine, a revolving sleeve turning in said bearing, a jointed element carrying said roll slidably connected to said sleeve but revolving therewith, and a yielding bearing for said element on said carriage.

9. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with a friction device including a friction roll and shoe, a movable carriage supporting one of said vibrating members, a shaft carrying said roll and yieldingly supported on said carriage, driving mechanism for said shaft, and a flexible joint between the shaft and said mechanism.

10. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage supporting one of said vibrating members, a revolving shaft carrying said roll and yieldingly supported on said car-

riage, a revoluble sleeve on a stationary part of the machine, said shaft being flexibly and slidably connected to said revolving sleeve.

11. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage supporting one of said vibrating members, a shaft carrying said roll and yieldingly supported on said carriage, a revolving driving-sleeve on a stationary part of the machine, a second sleeve slidably mounted within said driving-sleeve but connected thereto so as to revolve therewith, and a sliding connection between said shaft and said second sleeve.

12. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage supporting one of said vibrating members, a shaft carrying said roll and yieldingly supported on said carriage, a revolving driving-sleeve on a stationary part of the machine, a second sleeve slidably mounted within said driving-sleeve but connected thereto so as to revolve therewith, and a flexible connection between said shaft and said second sleeve.

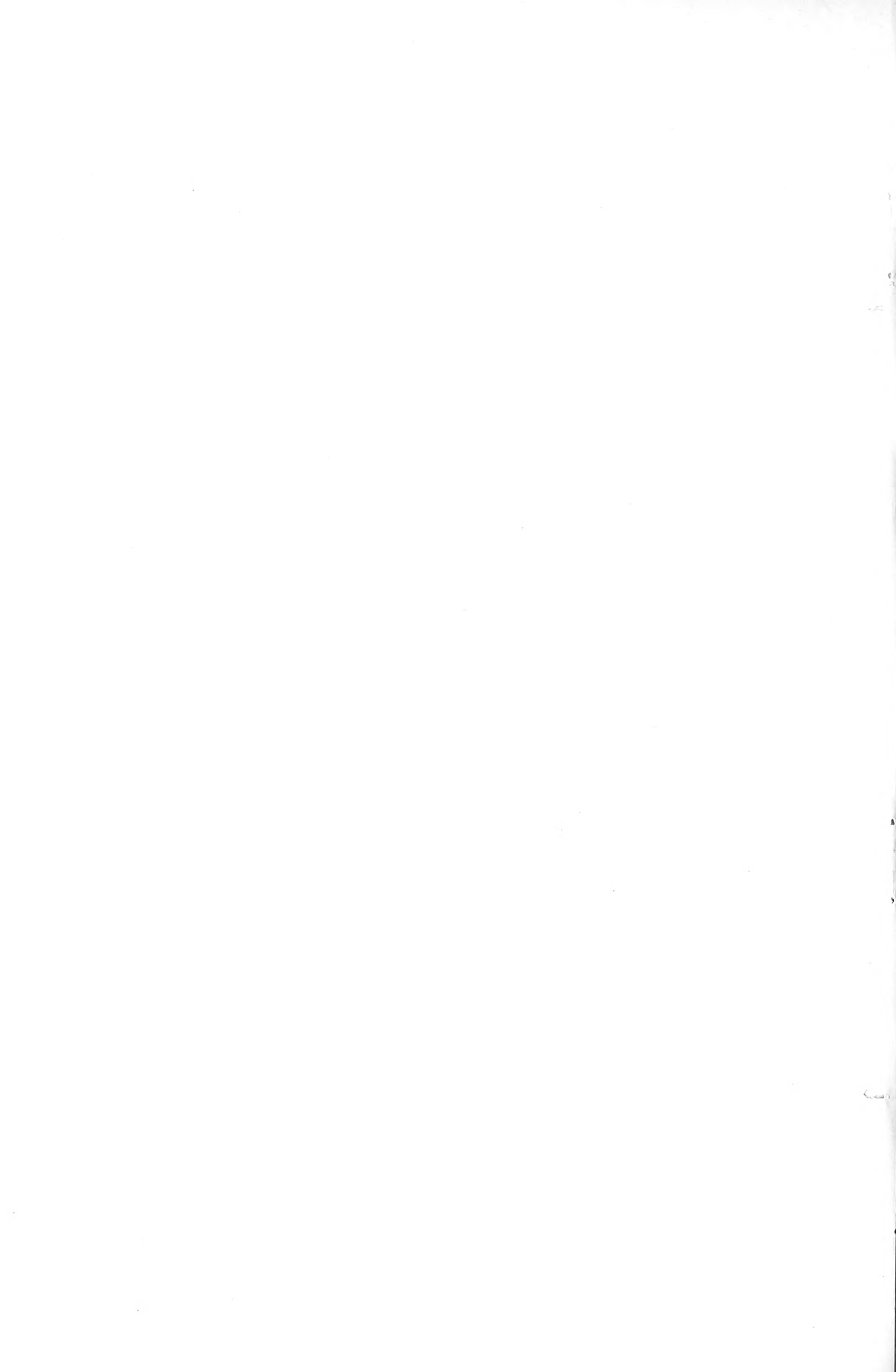
13. In a phonic apparatus, the combination of a primary and a secondary vibrating means, with an intermediate friction device including a friction roll and shoe, a movable carriage supporting one of said vibrating members, a shaft carrying said roll and yieldingly supported on said carriage, a revolving driving-sleeve on a stationary part of the machine, a second sleeve slidably mounted within said driving-sleeve but connected thereto so as to revolve therewith, and a sliding and flexible connection between said shaft and second sleeve.

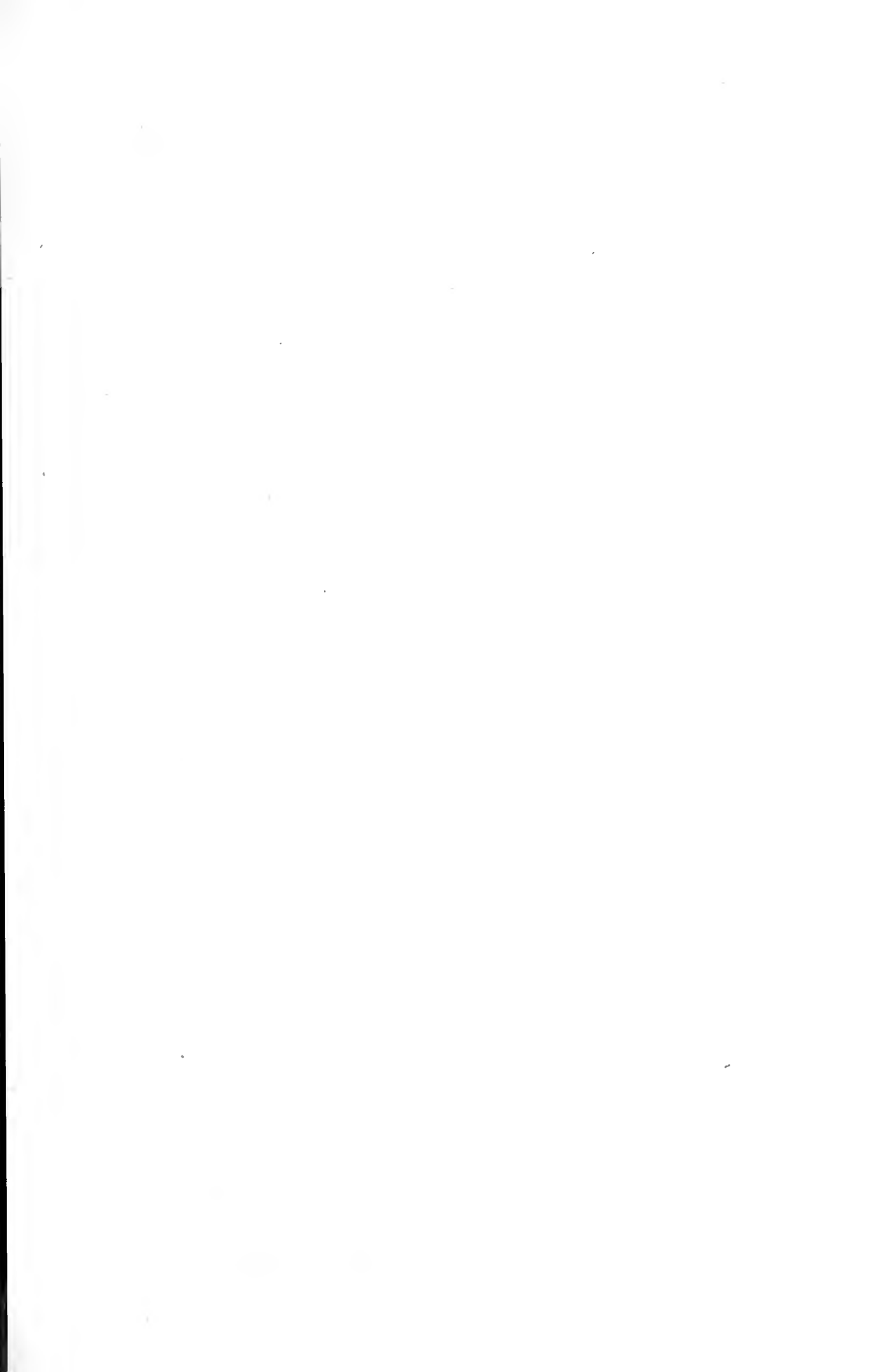
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,
C. A. GIBNER.





No. 796,857.

PATENTED AUG. 8, 1905.

J. F. OTT.
MACHINE FOR SHAVING SOUND RECORDS.

APPLICATION FILED JUNE 24, 1903.

3 SHEETS—SHEET 1.

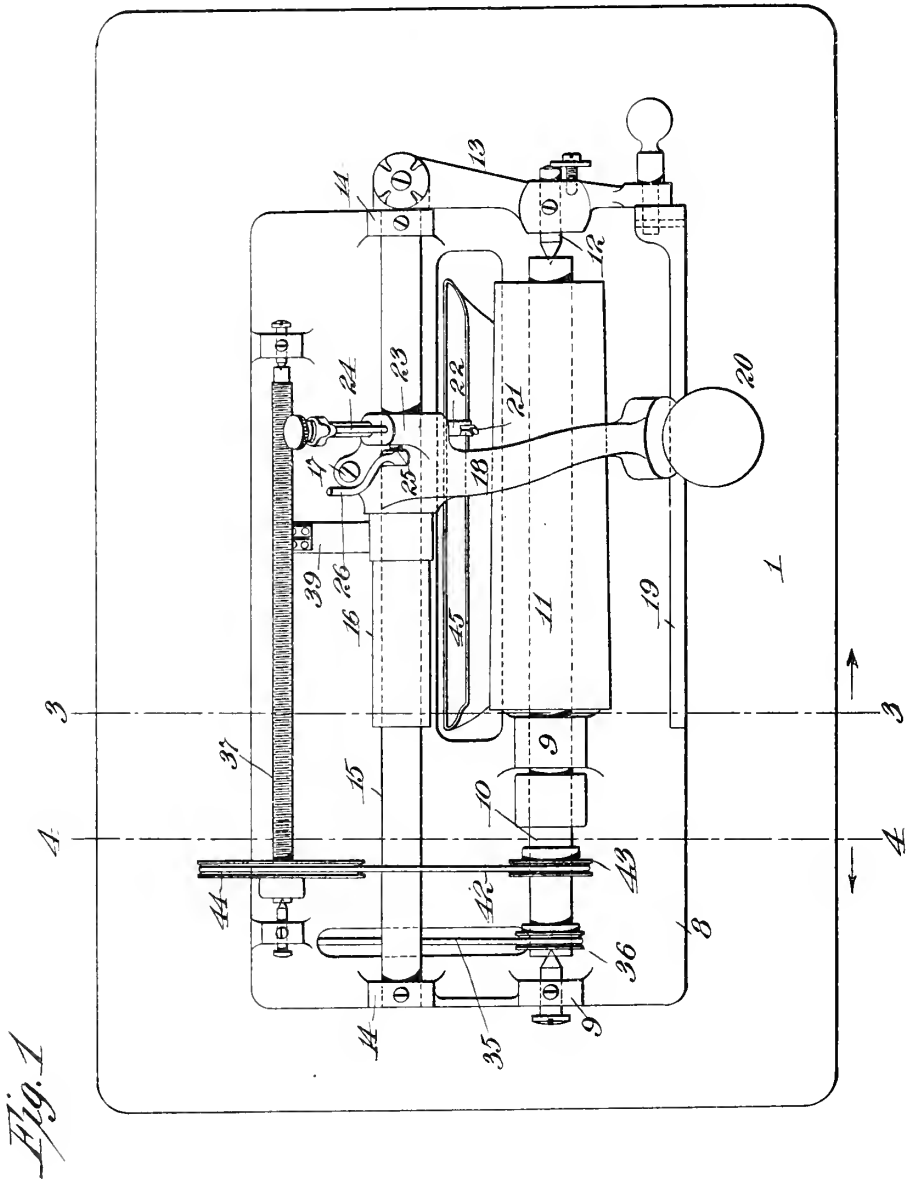


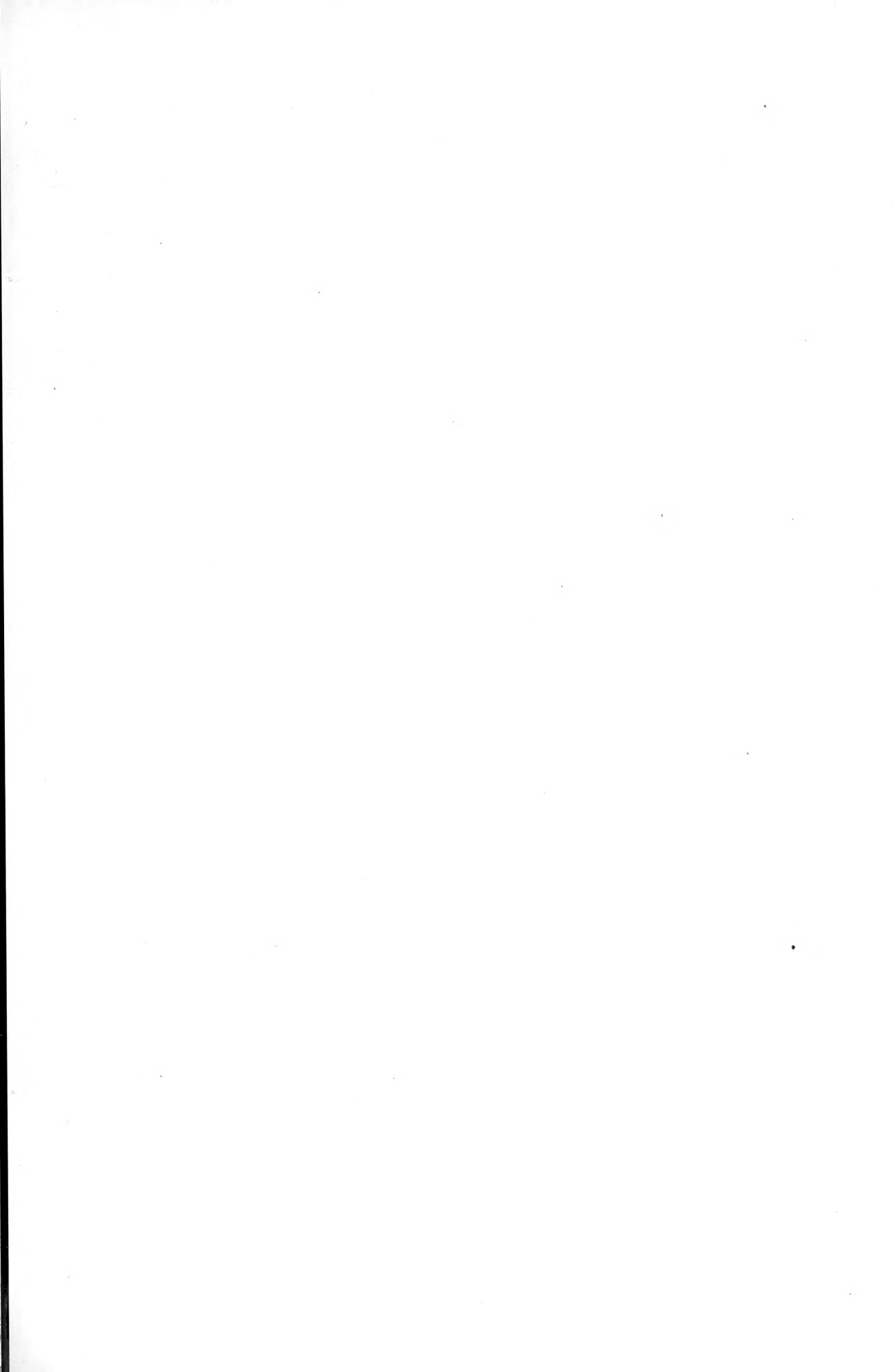
Fig. 1

Witnesses:

J. F. Coleman
L. R. Loveman

Inventor

John F. Ott
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Attorney



J. F. OTT.
MACHINE FOR SHAVING SOUND RECORDS.

APPLICATION FILED JUNE 24, 1903.

3 SHEETS—SHEET 2.

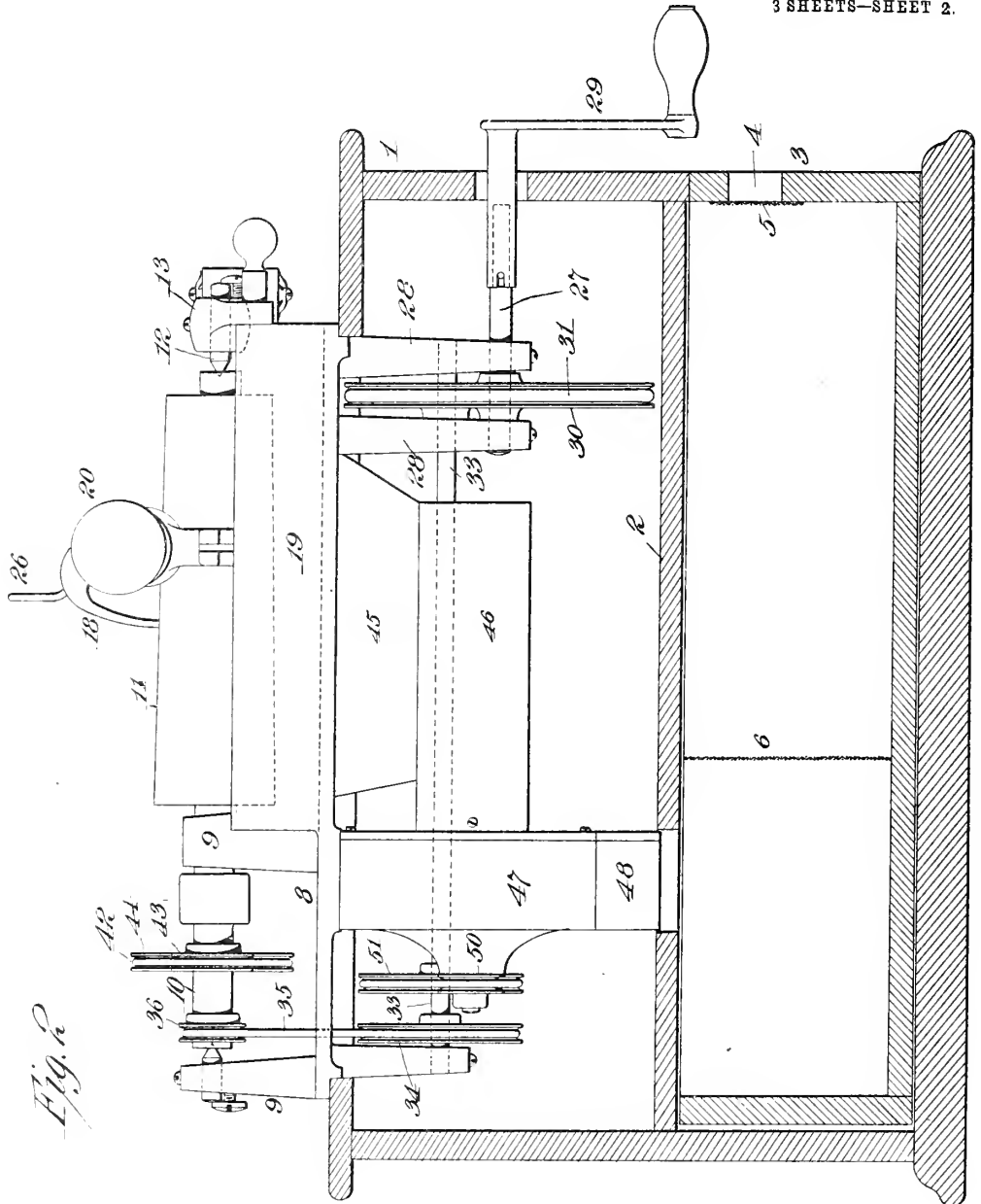


Fig. 2

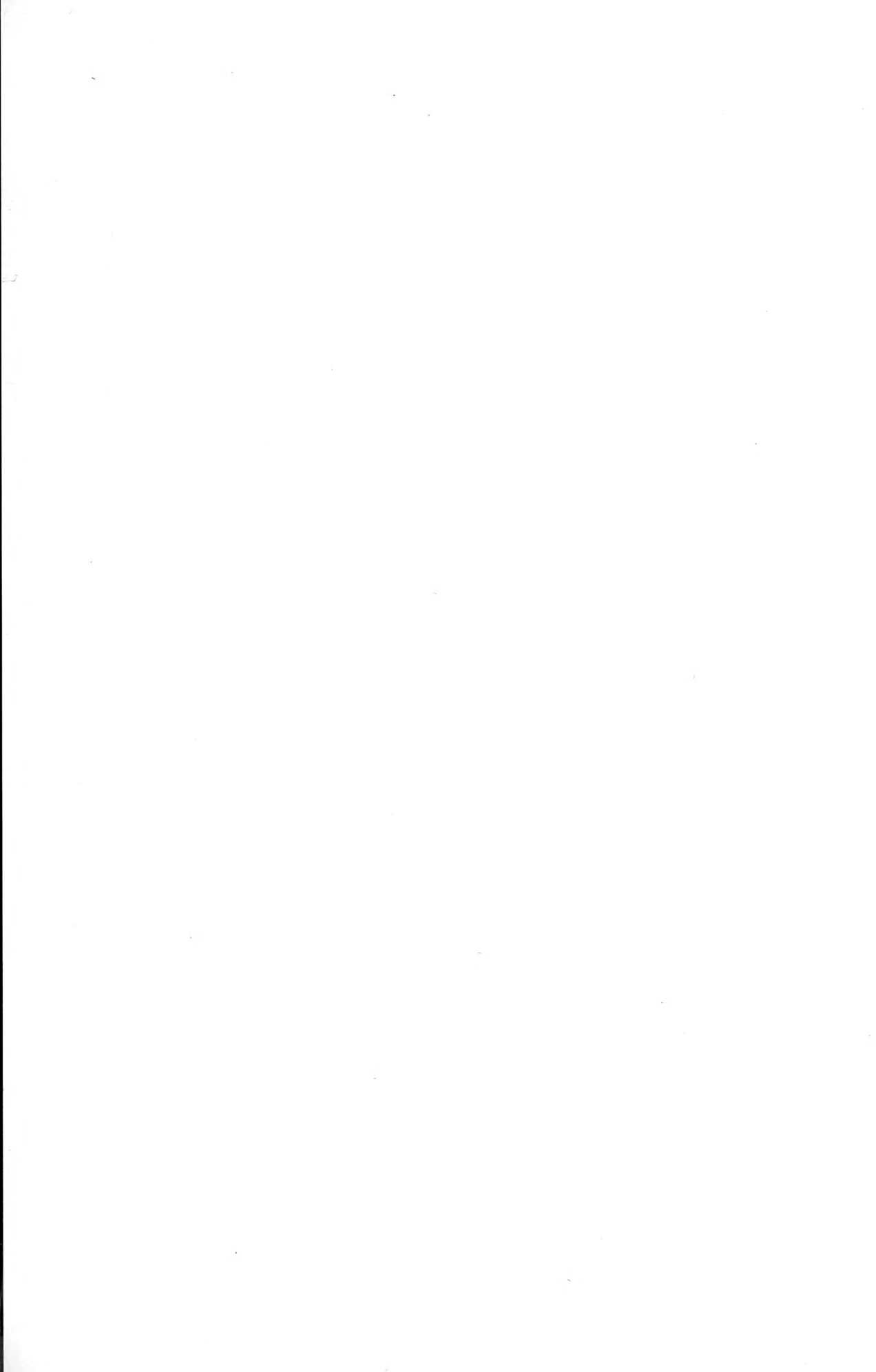
Witnesses:

J. F. Coleman
L. R. Loveman

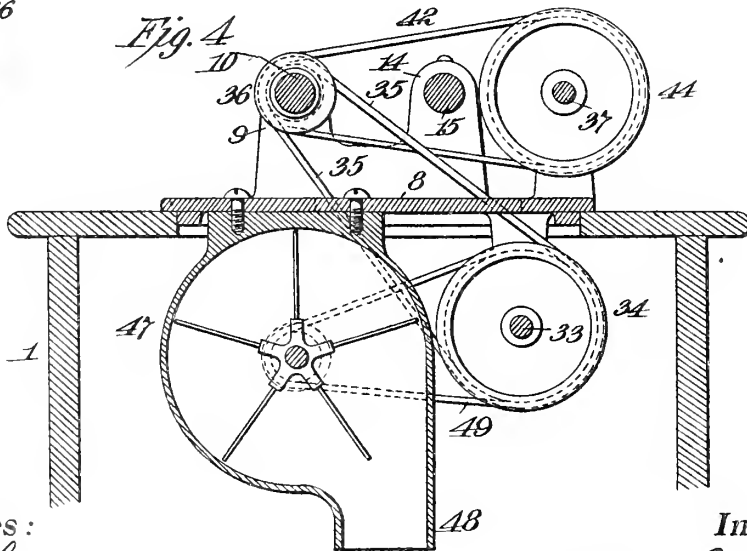
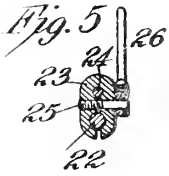
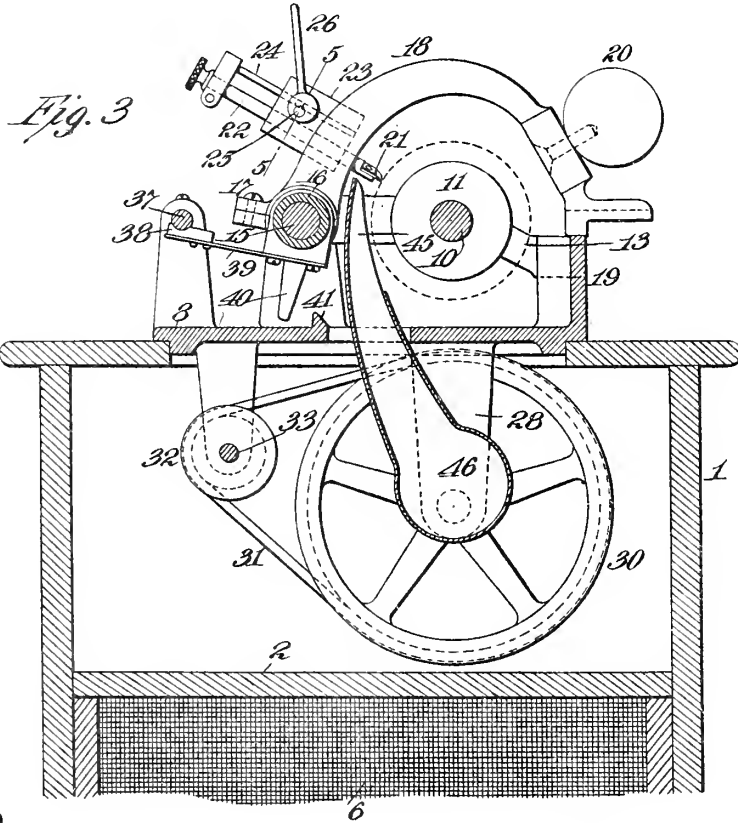
Inventor

John F. Ott
by Frank L. Ryan

Attorneys.



J. F. OTT.
MACHINE FOR SHAVING SOUND RECORDS.
APPLICATION FILED JUNE 24, 1903.



Witnesses:

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Inventor

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Attorneys.

UNITED STATES PATENT OFFICE.

JOHN F. OTT, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR SHAVING SOUND-RECORDS.

No. 796,857.

Specification of Letters Patent.

Patented Aug. 8, 1905.

Application filed June 24, 1903. Serial No. 162,962.

To all whom it may concern:

Be it known that I, JOHN F. OTT, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Machines for Shaving Sound-Records, of which the following is a specification.

My invention relates to machines for shaving phonographic cylinders or other sound-records; and my objects are to provide a simple and compact device for the purpose, one capable of efficient, rapid, and perfect operation and wherein finally generation of dust, chips, and shavings of wax outside of the machine is overcome.

The improved machine has been designed particularly for use in establishments where a large number of records require to be shaved—as, for instance, in offices using phonographs for commercial purposes.

Generally stated, the invention consists in providing a mandrel or other support for the record with a shaving-knife arranged to be moved into engagement with the record, means for rotating the mandrel or other support at a high speed, and a fan or blower for directing the wax, chips, shavings, or dust produced in operation into a suitable receptacle for the purpose, from which they may be subsequently removed, all as will be more fully hereinafter described and claimed.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a plan view of the complete machine with the operating-handle removed; Fig. 2, a front view, partly in section; Fig. 3, a section on the line 3 3 of Fig. 2 looking toward the right; Fig. 4, a section on the line 4 4 of Fig. 2 looking toward the left, and Fig. 5 a sectional view on the line 5 5 of Fig. 3.

In all of the above views corresponding parts are represented by the same numerals of reference.

The box or cabinet 1 is formed with a horizontal partition 2, below which is a sliding drawer 3, having an outlet-opening 4, covered by a screen or gauze 5. This drawer is also provided with a vertical gauze or perforated partition 6, through which the air

passes from the fan and by which a considerable proportion of the larger shavings will be separated from the air.

Located over an opening in the top of the cabinet or case 1 is a plate 8, carrying the bearings for the operative parts. Mounted in bearings 9 9 on this plate is a shaft 10, which carries the mandrel 11, over which is inserted the record to be shaved. The free end of this mandrel is supported by an end bearing 12, carried by a pivoted gate 13 in the usual manner. Secured to uprights 14 on the plate 8 is a stationary back rod 15, on which is slidably mounted a sleeve 16. Secured to this sleeve by a clamping-screw 17 is an arm 18, which straddles the mandrel and slides at its front end along the usual front bar 19. A weight 20 or its equivalent may be carried by the front end of the arm 18, so as to keep the shaving-knife in its proper engagement with the record. This knife, as shown particularly in Fig. 3, is composed of a sapphire cutting-tool 21, carried on the end of a rod 22, passing through a split sleeve 23 and connected to a guide-pin 24, working in an opening in said sleeve to prevent the shaving-knife from turning axially. The shaving-knife is locked in any desired position of adjustment by a screw 25 for clamping the two portions of the split sleeve on the rod 22, said screw being operated by a finger-piece 26.

The mandrel 11 is rotated at a high speed by any suitable arrangement of power-transmission device. In the specific form of the invention illustrated I mount a main shaft 27 in bearings 28, depending from a plate 8, and engage a removable handle 29, with the shaft to rotate the latter. The shaft 27 carries a pulley 30, which through a belt 31 drives a small pulley 32 on a counter-shaft 33. This counter-shaft carries a pulley 34, (see Fig. 2,) which drives through a belt 35 to the small pulley 36 on the mandrel-shaft 10.

In order to feed the shaving-knife lengthwise of the record to properly shave the same, I make use of a relatively coarse-threaded feed-screw 37, with which engages a feed-nut carried on a spring-arm 39, screwed to the sleeve 16. When the arm 18 is elevated to lift the shaving-knife from the record, the nut 38 will be disengaged from the feed-screw, so as to permit the shaving-knife to be

slid back to its starting position. The movement of the arm 18 axially with respect to the back rod 15 is limited by a finger 40 engaging a shoulder 41 on the plate 8. The feed-screw 37 is rotated in any suitable way—as, for instance, by a belt 42, extending between pulleys 43 and 44 on the shaft 10 and feed-screw 37, respectively.

In order to dispose of chips, shavings, and wax dust in the operation of the device, I arrange an open trough 45 lengthwise of the mandrel 11 and immediately below the path of the shaving-knife. This trough at its lower end communicates with a conduit 46, leading to a small centrifugal fan 47, whose discharge-outlet 48 communicates with an opening in the partition 2 immediately behind the screen 6 in the drawer. The fan 47 in operation produces a suction immediately adjacent to the shaving-tool, so that any particles of wax removed thereby will be drawn into the fan and be discharged into the back portion of the drawer 3. The air escapes through the screens 5 and 6 and deposits the wax particles in the drawer, which can be cleaned out from time to time, as required. The fan 47 is operated in any suitable way—as, for instance, by a belt 49, extending between pulleys 50 and 51 on the fan-shaft and counter-shaft 33, respectively.

In operation the record or blank to be shaved is placed on the mandrel 11 and the knife engaged therewith and locked tightly in place. The handle 29 is now turned so as to rotate the mandrel at a high speed—say

about two thousand revolutions per minute—whereby a very effective and perfect shaving operation will take place, as will be understood. In this operation all particles of wax will be sucked down and deposited in the drawer 3, so as to thereby overcome one of the most serious objections to shaving-machines as now constructed, since in such prior machines the particles of wax not only soon cover all the working parts, but become distributed throughout the room in which the shaving is effected.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

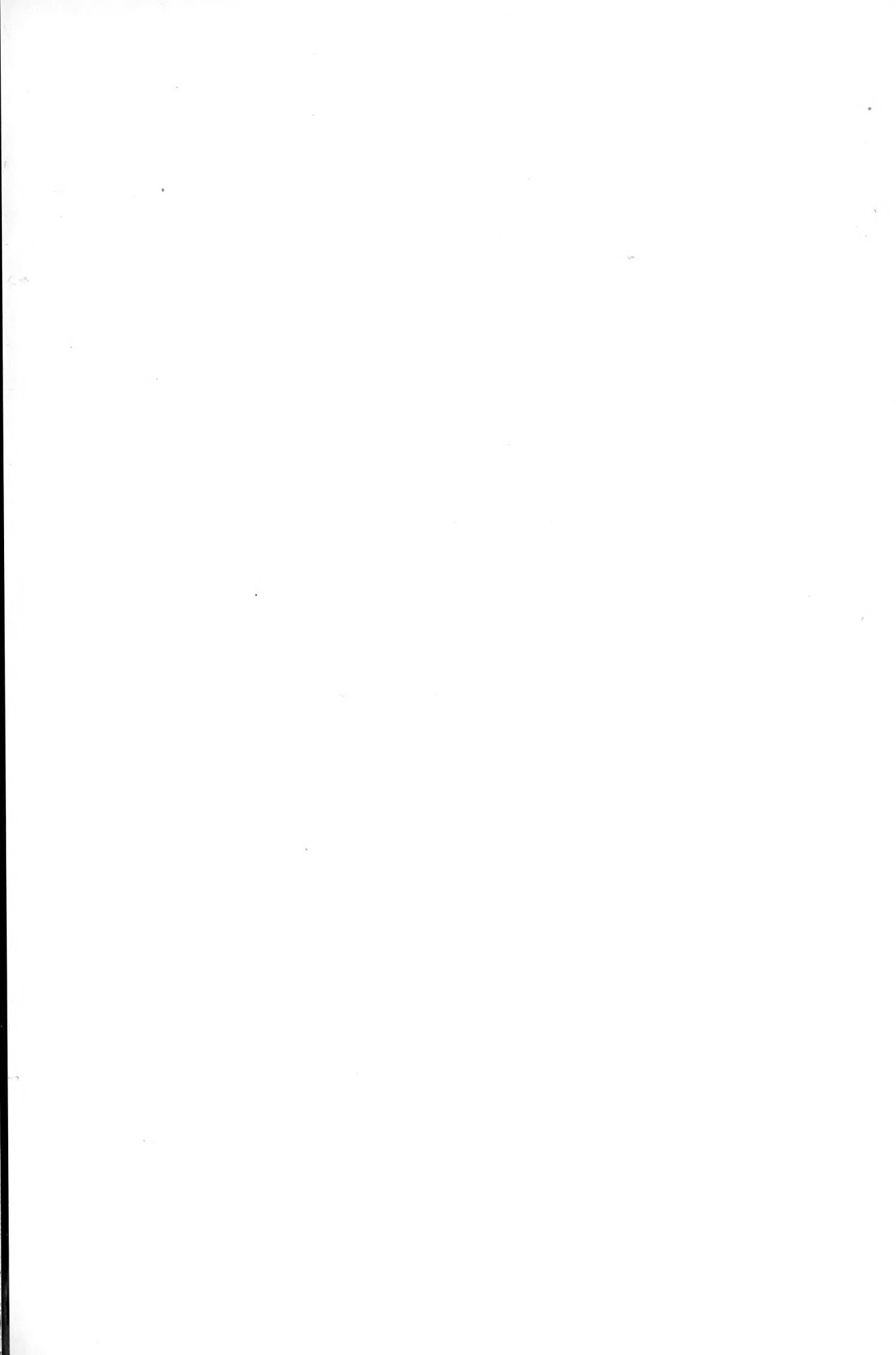
In a shaving-machine, the combination with a support for a sound-record or blank and a shaving-knife movable longitudinally with respect to said support, of means for rotating said support, a suction-tube comprising an inlet adjacent to the rotating support and knife and at least equal in width to the distance traveled by the knife, a receptacle, and a discharge to the atmosphere, a fan for creating an air-draft through said suction-tube, and a screen for preventing the escape to the atmosphere of particles drawn through the suction-tube into the receptacle, substantially as set forth.

This specification signed and witnessed this 22d day of June, 1903.

JOHN F. OTT.

Witnesses:

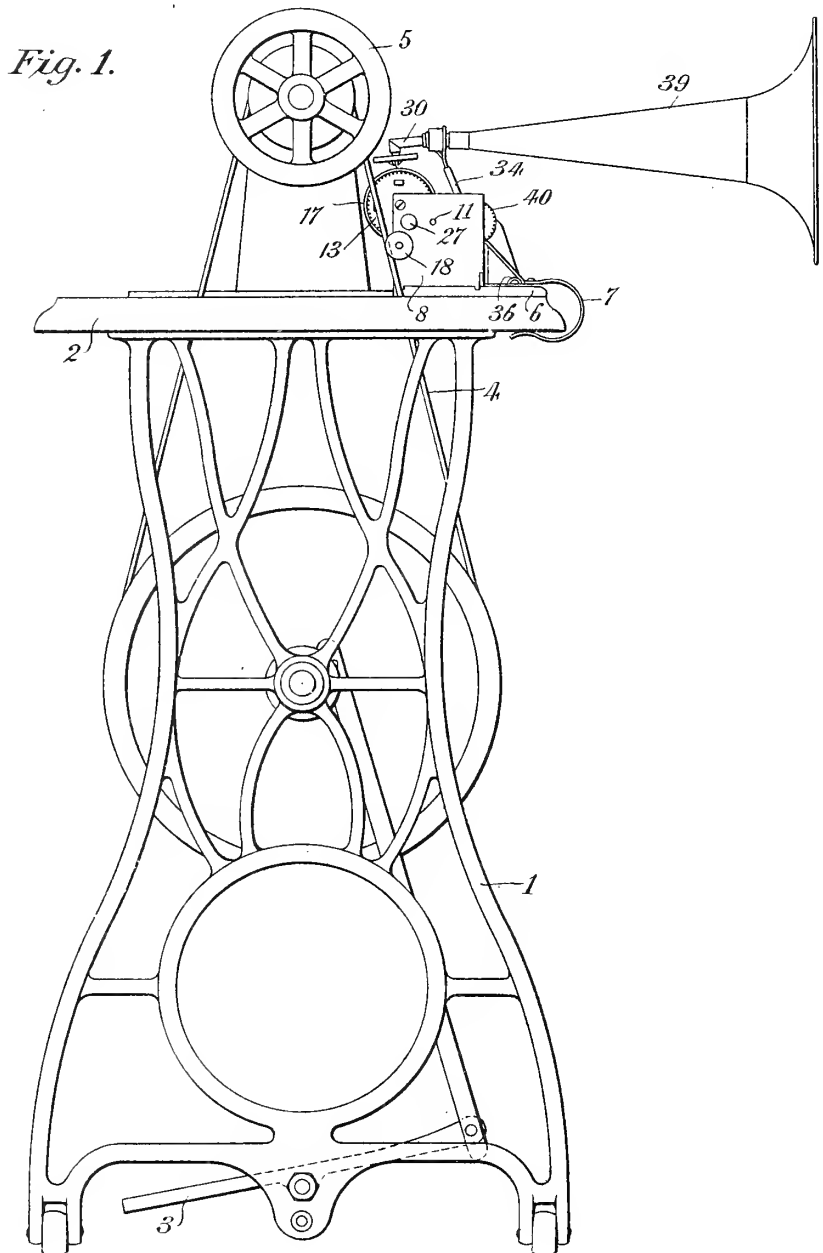
FRANK L. DYER,
ARTHUR W. BALDWIN.



E. J. RECTOR.
PHONOGRAPH.

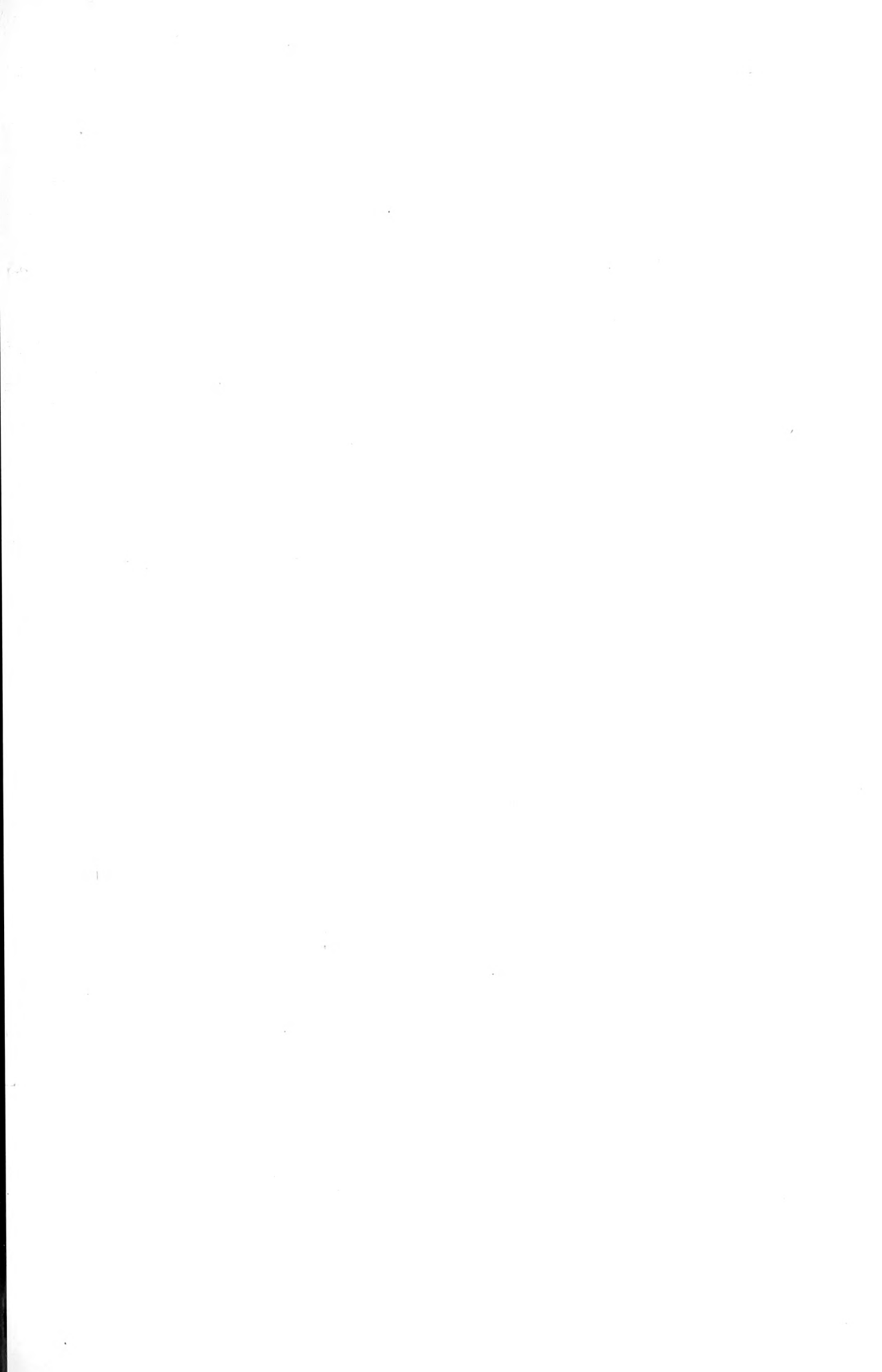
APPLICATION FILED MAY 28, 1904.

3 SHEETS—SHEET 1.



WITNESSES:
C. E. Ashley
M. Clark

INVENTOR
Enoch J. Rector,
By his Attorney,
Richard Warren Parkley.



E. J. RECTOR.
PHONOGRAPH.

APPLICATION FILED MAY 28, 1904.

3 SHEETS—SHEET 2.

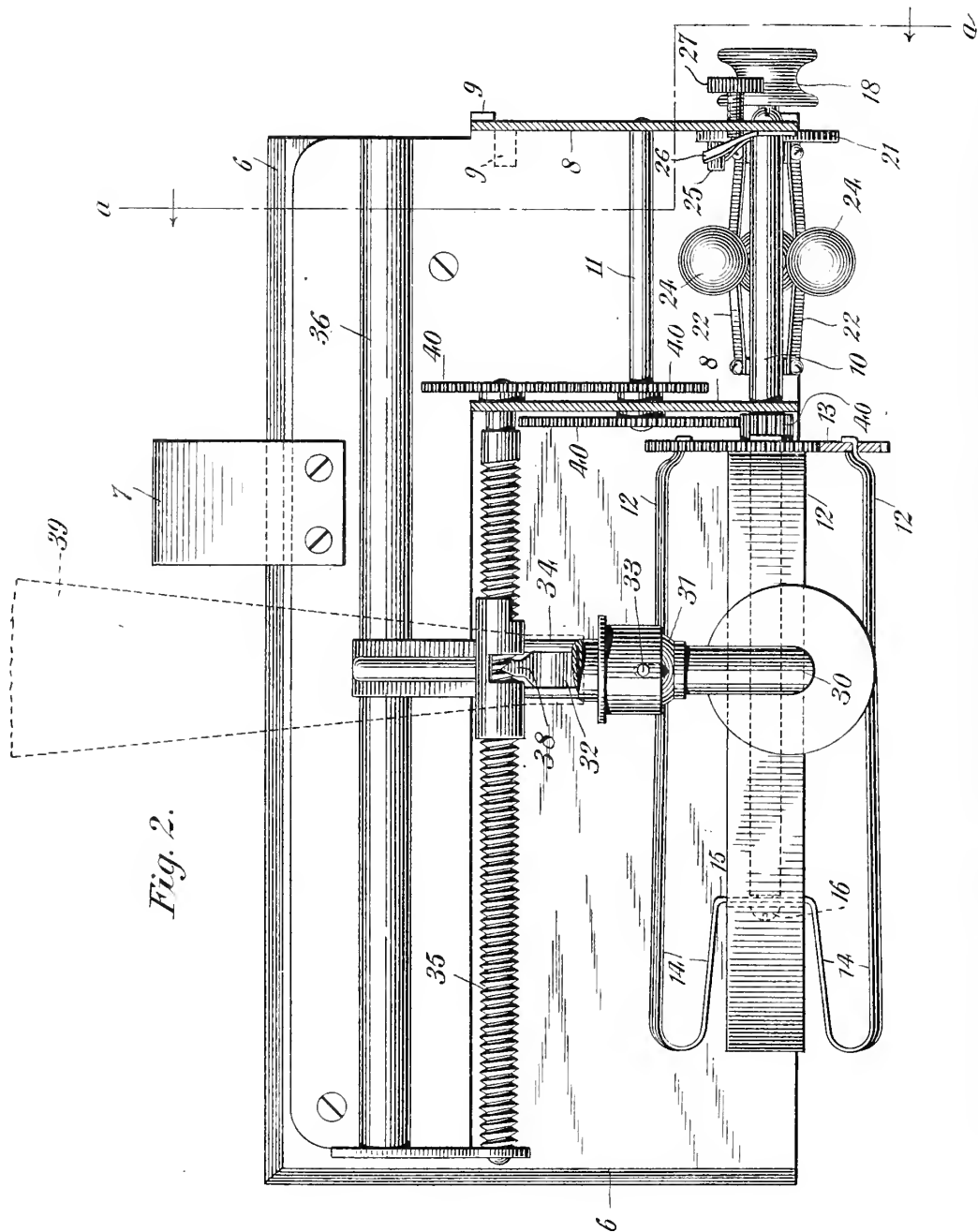
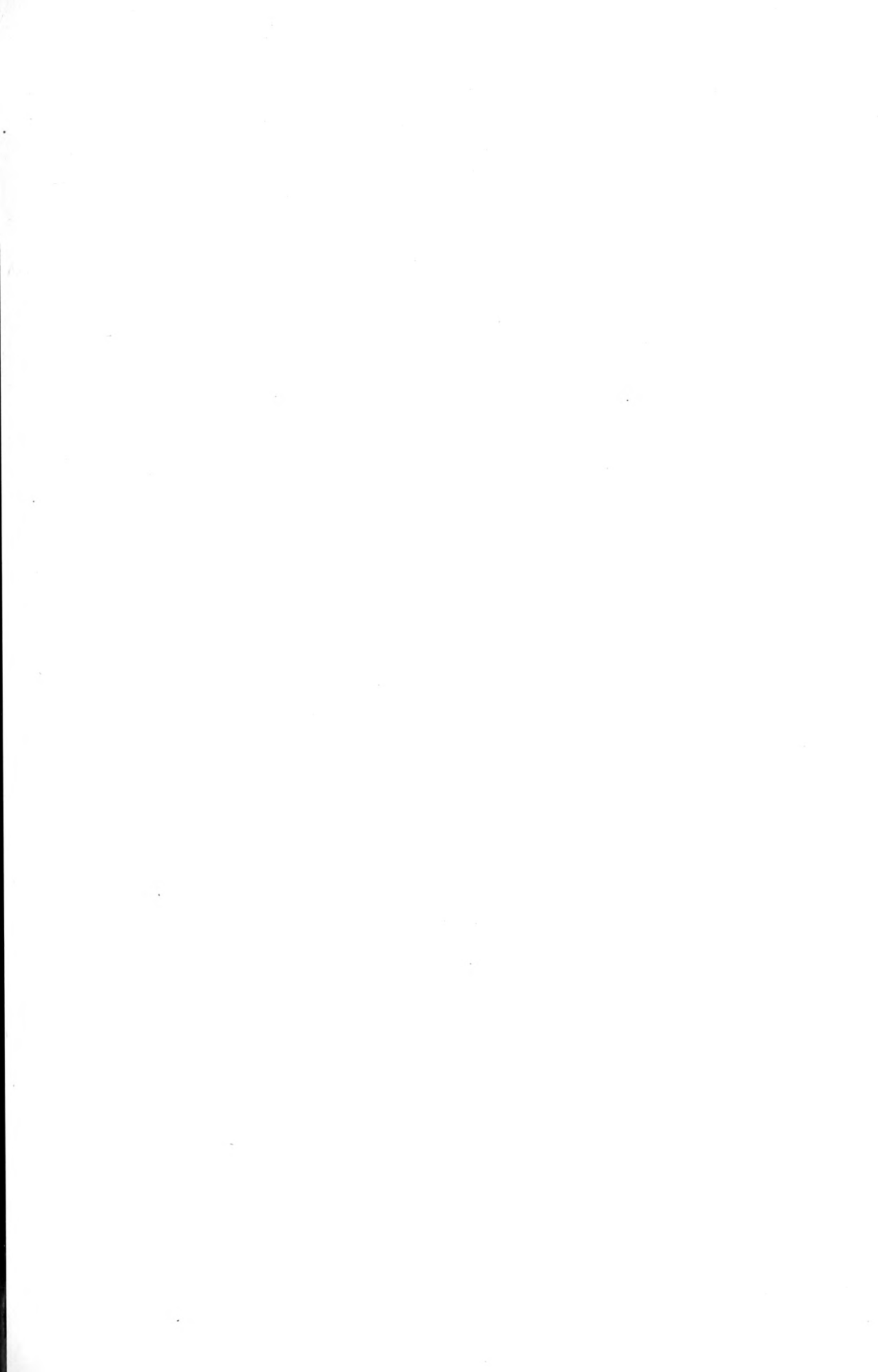


Fig. 2.

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APPLICATION FILED MAY 28, 1904.

3 SHEETS—SHEET 3.

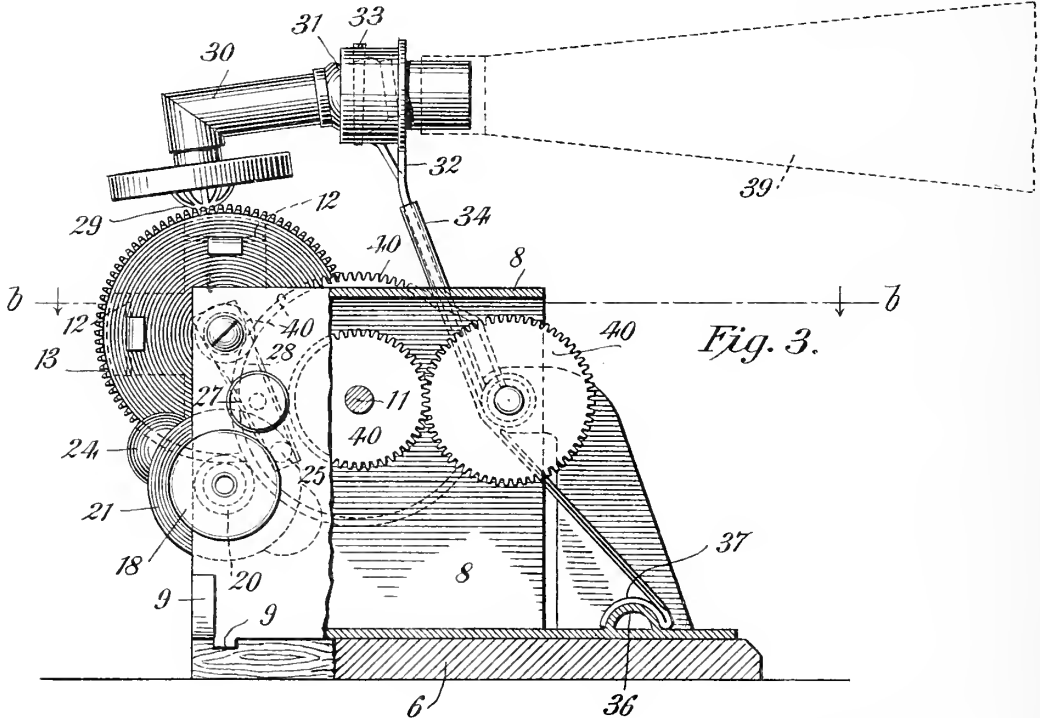


Fig. 3.

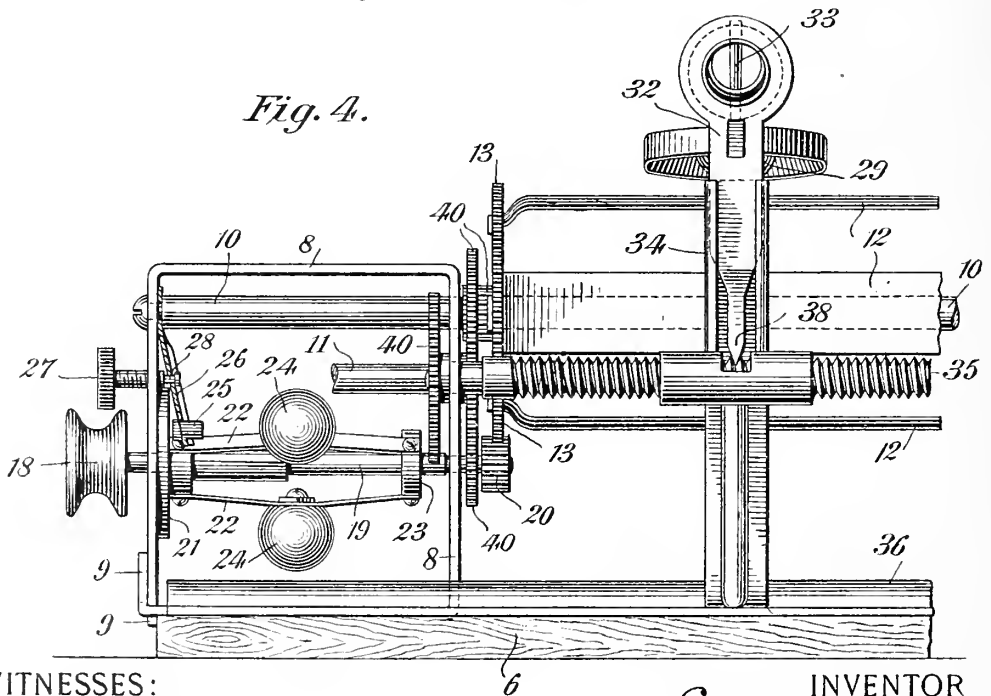


Fig. 4.

WITNESSES:
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M. C. Clark

INVENTOR
Enoch J. Rector
 By his Attorney,
Richard Warren Parkley.

UNITED STATES PATENT OFFICE.

ENOCH J. RECTOR, OF PARKERSBURG, WEST VIRGINIA.

PHONOGRAPH.

No. 797,020.

Specification of Letters Patent.

Patented Aug. 15, 1905.

Application filed May 28, 1904. Serial No. 210,153.

To all whom it may concern:

Be it known that I, ENOCH J. RECTOR, a citizen of the United States, and a resident of Parkersburg, in the county of Wood and State of West Virginia, have invented a certain new and useful Improvement in Phonographs, of which the following is a specification.

One object of the present invention is to attach a phonograph to and operate the same by the driving-belt of the ordinary sewing-machine or the like.

Another object is to simplify and improve the construction and operation and to reduce the cost of manufacture of the phonograph.

Other objects will appear hereinafter.

One form of the invention is illustrated in the accompanying drawings, forming part hereof, in which—

Figure 1 is an end elevation of a sewing-machine and phonograph attached thereto. Fig. 2 is a plan view, partly in section, of the phonograph. Fig. 3 is an end elevation of the same, partly broken away to show more clearly certain parts; and Fig. 4 is a front elevation of the same, also partly broken away.

Referring to the drawings, the reference-numeral 1 marks a sewing-machine end frame, and 2 the table. 3 marks the usual treadle; 4, the usual belt driven from said treadle, and 5 the usual fly-wheel driven by the belt. Inasmuch as the sewing-machine is a well-known article, its details need not be more particularly described; but it may be remarked that the sewing mechanism is and preferably should be disconnectible in order that the noise of running the same may be avoided when the phonograph is in use.

The reference 6 denotes a base-board which is adapted to be placed on the table 2, and 7 marks a spring-clamp for holding the board and phonograph in position on the table.

The reference 8 denotes a sheet-metal framework preferably stamped out of one piece and bent into shape and locked together by lugs 9 to form a rigid construction.

10 denotes a rod or shaft which, by preference, is fixed in and projects at one end beyond the box-like part of the framework 8, and 11 designates a tie-rod for holding the box-like part rigidly together in addition to the lugs 9, or the shaft 11 may rotate and form an axis for members of the train of gears hereinafter mentioned.

The rod or shaft 10 forms a support for the record-holder and its driving-gear. The

holder shown in the drawings consists of leaf-springs 12, which have their ends made fast in the gear 13 and have their outer surfaces curved to fit the inside of the hollow record and which have their middle portions formed into loops 14, united by straight parts 15. The parts 15 are connected by a screw or pin 16 with the end of the shaft 10 and rotate on said screw or pin when the said rod or shaft 10 is fixed, and the like is true of the gear 13 in such case. The looped ends of the holder-springs are, by preference, of greater diameter than the holder is where the springs are bent to connect them to the gear 13—that is, the holder is of greater diameter at the end thereof farthest from the gear 13. The springs compress as the record 17 is slid on. The described holder gives a firm grip on the record at all times and prevents the same from working loose, while permitting of its ready removal at any time.

The gear 13 and record-holder are driven from the belt 4 by means of a belt-pulley 18, the shaft 19, to which the pulley is fast, and the pinion 20, which is fast on the shaft 19 and which meshes with the gear 13. The speed of the gear is controlled and varied by the following devices: A disk 21, loose on the shaft 19, is connected by leaf-springs 22 to a collar 23, fast on the shaft 19, and weights 24 are fastened to the springs 22, so as to bend said springs and move the disk 21 along the shaft 19 whenever the speed of the shaft 19 rises beyond a given rate, and a brake device is provided against which the disk 21 is drawn by the weights, said brake being marked 25. The brake 25 is carried by an arm 26, which is held between the shaft 10 and the frame 8, and the position of the brake 25 may be varied by means of a screw 27, which has a groove 28 therein which engages with the arm 26. By turning the screw 27 the position of the arm 26 may be varied, thus varying the point at which the weights bring disk 21 into contact with the brake 25.

The speaker or reproducer 29 is mounted on a tubular elbow 30, which is pivotally connected by a hollow ball-and-socket joint 31 to a carrier 32. A pin-and-slot connection 33, between the members of the ball-and-socket joint, allows the speaker to rise and fall in order to put on and take off records. The carrier 32 slides on a guide 34, which is sleeved on the feed-screw 35 and which is held from rotating by a rib 36 on the base of the frame

8 and a cooperating lug 37 on the carrier. The carrier 32 is also provided with a point 38, which is adapted to engage with the thread of the screw 35 to connect the guide and screw, and so to cause the screw to move the guide and carrier along. The reference 39 denotes a horn connected frictionally with the carrier 32. The screw 35 is driven from the gear 13 by a reducing-train 40. When it is desired to run the speaker back, the carrier 32 is lifted until the point 38 is disengaged from the screw 35, when the guide and carrier may be slid back.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A phonograph having its holder formed of springs fixed to a driving-gear.

2. A phonograph having its record-holder formed of leaf-springs fixed at the end to a driving-gear and looped inward and connected with the axis of said gear.

3. In a phonograph, a driving-gear, a shaft on which said gear rotates, and a record-holder formed of leaf-springs fixed to said gear and looped inward and rotatably connected with the shaft, in combination.

4. In a phonograph, a record-holder consisting of leaf-springs, a gear to which said springs are made fast, a shaft carrying said gear, and means for connecting said springs with said shaft, in combination.

5. In a phonograph, a drive-shaft, a belt-pulley fast thereon, a drive-belt touching said pulley at one point only, a record-holder geared to said shaft, and an automatic brake device, in combination.

6. The combination of a treadle-driven belt, a driven pulley to which said belt is practically tangent, and a phonograph driven thereby, with a brake device interposed between the belt and record-holder.

7. The combination of a driving-belt, a driven pulley to which said belt is practically tangent, and a phonograph driven thereby,

with an automatic brake device for regulating the speed of the phonograph.

8. In a phonograph, a belt-driven shaft, a collar fast on said shaft, a disk loose on said shaft, springs connecting said collar and disk, weights carried by said springs, and an adjustable brake normally disengaged from and against which said weights draw said disk, in combination with a record-holder actuated by said shaft.

9. In a phonograph, the combination with a feed-screw, a guide sleeved on said screw, and a reproducer-carrier slidable on said guide transversely to and adapted to be engaged with said screw.

10. In a phonograph, the combination with a feed-screw, a guide sleeved on said screw, a carrier movable on said guide transversely to and connectible and disconnectible to and from said screw, and a reproducer pivotally connected with said carrier.

11. In a phonograph, the combination of a feed-screw, a guide sleeved thereon and movable therealong, means for preventing rocking motion of said guide on said screw, a carrier slidable on said guide and thereby connectible and disconnectible to and from said screw, and a reproducer pivotally connected with said carrier.

12. In a phonograph, the combination of a frictionally-driven shaft, a disk movable along and rotating with said shaft, weights for moving said disk along said shaft, and a brake normally disengaged from and against which said weights draw said disk, with a record-holder actuated by said shaft.

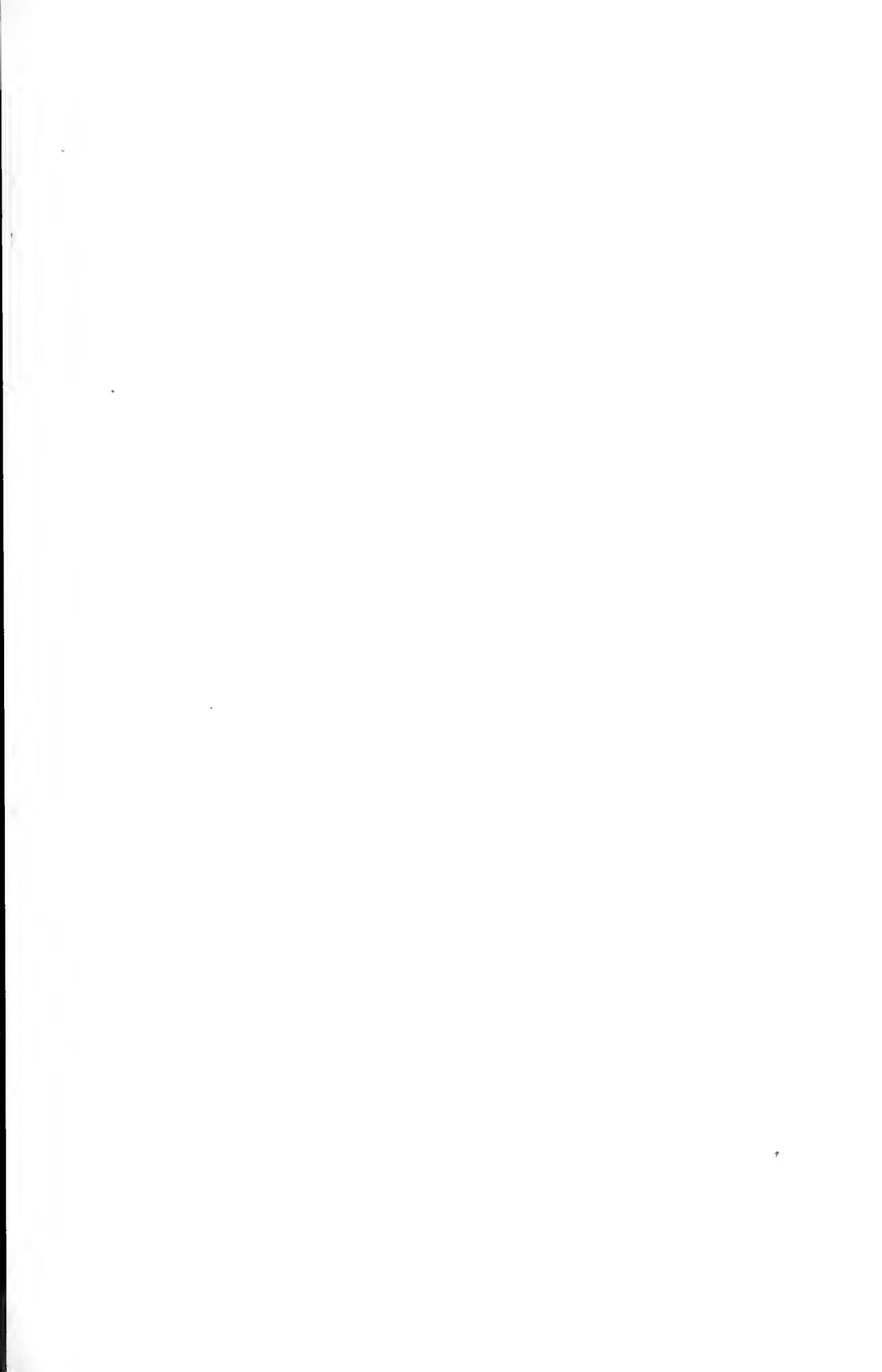
Signed at New York, in the county of New York and State of New York, this 23d day of May, A. D. 1904.

ENOCH J. RECTOR.

Witnesses:

FRANK RYALL,

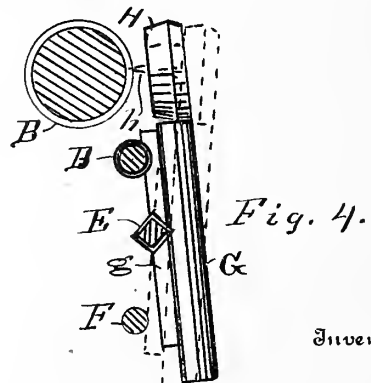
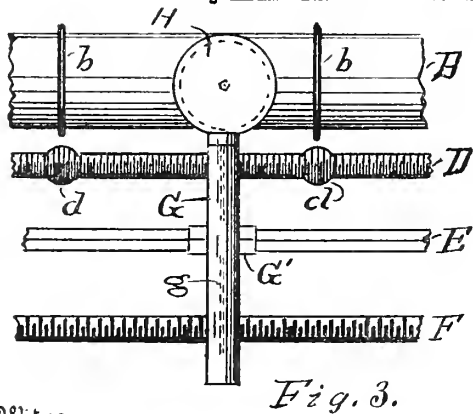
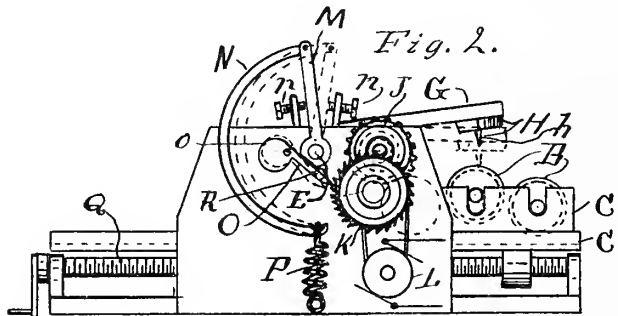
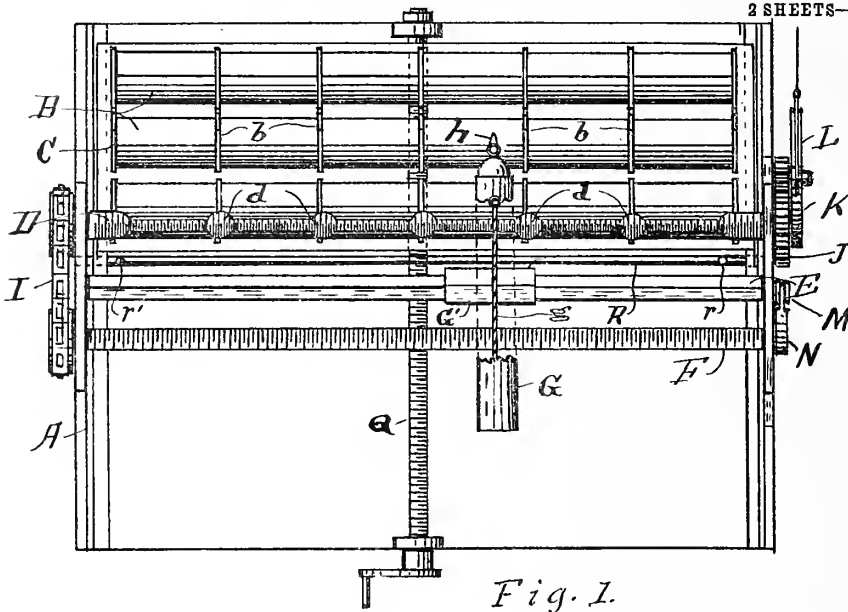
RICHARD W. BARKLEY.



J. C. DUNTON.
FEED MECHANISM.

APPLICATION FILED NOV. 28, 1904.

2 SHEETS—SHEET 1.



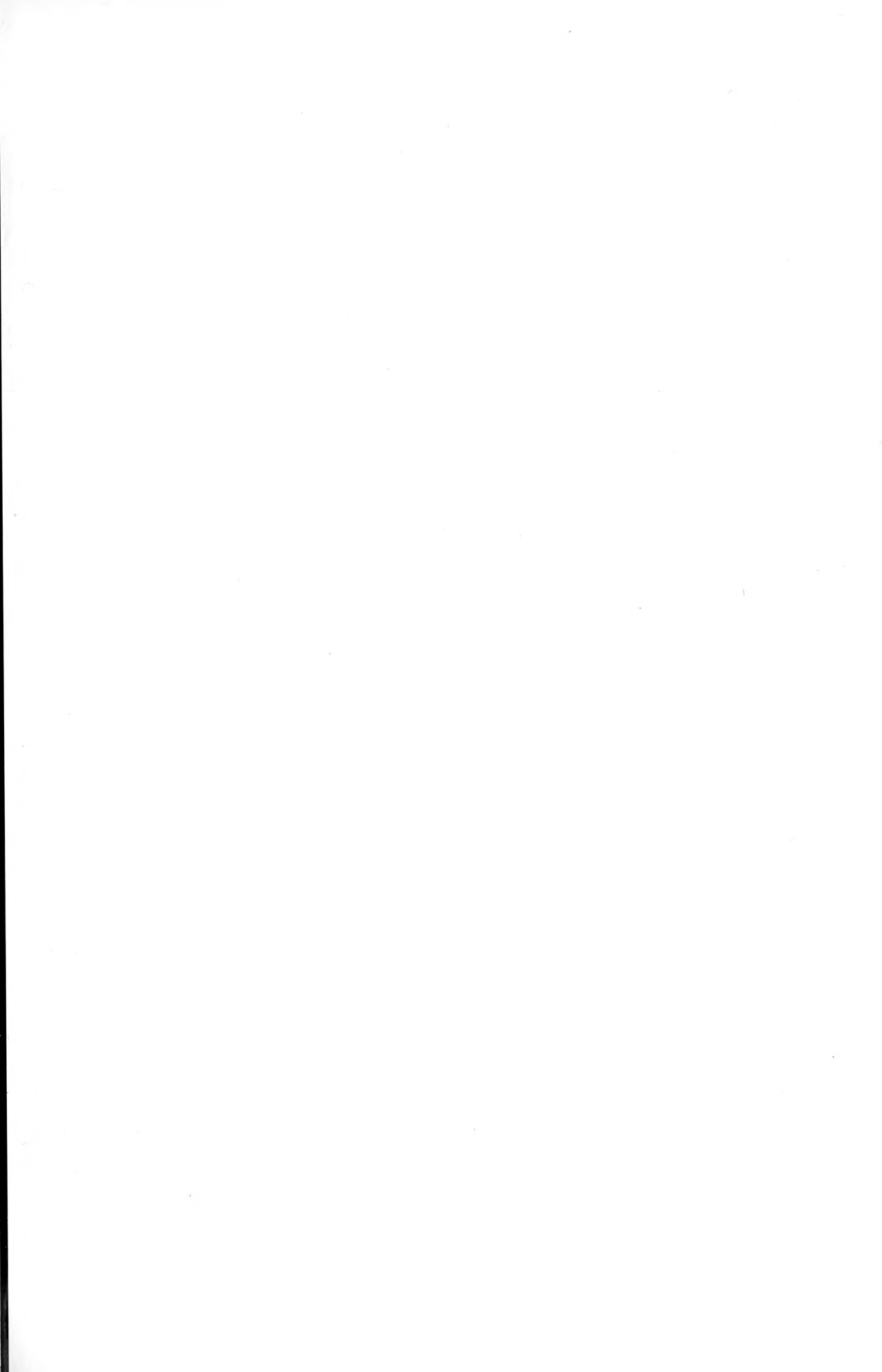
Witnesses

Georgia E. Killey.
Lou Killey.

384

John C. Dunton

Whit J. Killey
Attorney



J. C. DUNTON.
FEED MECHANISM.
APPLICATION FILED NOV. 28, 1904.

2 SHEETS—SHEET 2

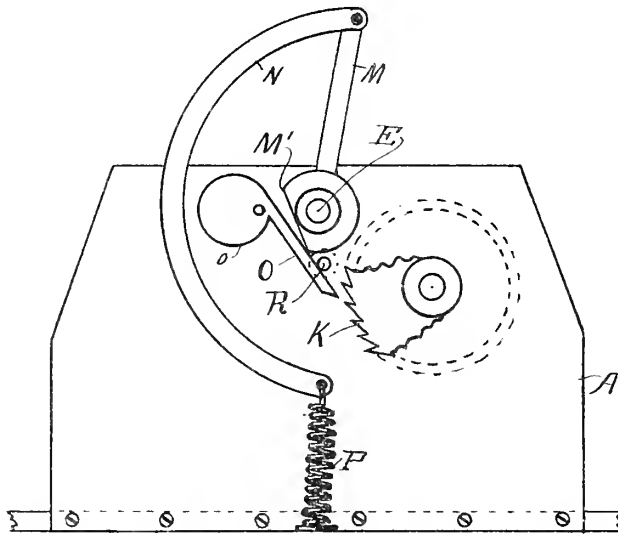


Fig. 5.

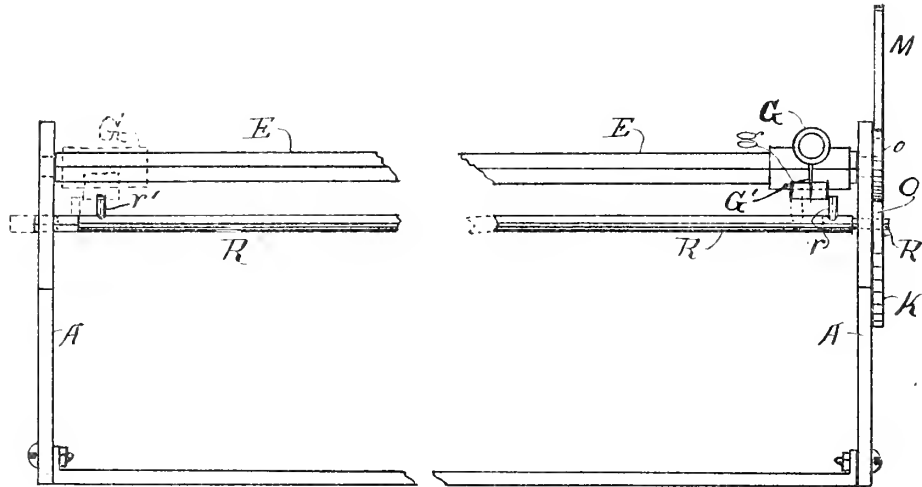


Fig. 6.

Inventor

John C. Dunton

Christ J. Gilley

Attorney

Witnesses

A. Algier
Louie Colley.

By

UNITED STATES PATENT OFFICE.

JOHN C. DUNTON, OF GRAND RAPIDS, MICHIGAN.

FEED MECHANISM.

No. 797,102.

Specification of Letters Patent.

Patented Aug. 15, 1905.

Application filed November 28, 1904. Serial No. 234,663.

To all whom it may concern:

Be it known that I, JOHN C. DUNTON, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Feed Mechanism, of which the following is a specification.

My invention relates to improvements in feed-screws; and its especial object is to provide a feed-screw that will at stated distances operate a lever to disconnect its bearing end from a given point of contact and also to reverse the motion and direction of the feed when desired. I attain these objects by the mechanism illustrated in the accompanying drawings, representing the feed-screw applied to a compound record-phonograph as being well designed to illustrate the operation of the screw, and in which—

Figure 1 is a plan of the phonograph, showing the application of the screw. Fig. 2 is an end elevation of the same. Fig. 3 is an enlarged plan of the feed-screw, the reverse-screw, the rocker-shaft, and the lever in connection with a section of a compound record-roller. Fig. 4 is the same turned up edgewise to show the action of the feed-screw upon the lever. Fig. 5 is an end elevation of the machine, showing an enlarged view of the pawl and the hub of the actuating-lever; and Fig. 6 is a side elevation of the machine dismantled of everything except the rocker-shaft and its attachments, the trip-rod, the pawl, and the ratchet-wheel.

Similar letters refer to similar parts throughout the several views.

In the accompanying drawings, A represents the supporting-frame of a phonograph.

B represents compound record-rollers having divisions *b* at given distances apart, the space between each pair of these divisions representing the full length of a complete record, by which means several complete records may be placed upon one roll, and the necessary object to be attained is to carry the point *h* of the reproducer H up and over the divisions *b* without necessarily stopping the travel of the lever or reproducer-holder G, and for this purpose I have invented the screw D, having enlargements *d* directly opposite each division *b* on the record-roll B, the screw-thread being continuous over these enlargements, so that the lever G continues to be carried longitudinally of the feed-screw as

long as the knife *g* is engaged by the screw-threads of the feed-screw, whether upon the body of the screw or climbing up or down over the enlargements.

With a phonograph built simply as above described it will be readily conceived that the reproducer will be carried the entire length of the record-roll, being carried over each division *b* as it approaches it, thus exhausting the entire set of records without stopping; but to utilize the feed-screw to the best advantage I have arranged a trip by means of which the machine may be stopped as the lever is being carried over the enlargements *d*, or may, upon reaching the end of the rolls, be reversed and the reproducer H carried back to the place of beginning on the record-rolls, as follows: In applying this feed-screw to a phonograph I have provided the variable feed-screw D, the rocker-shaft E, upon which the lever G is mounted by means of the slide G', so that it may be easily carried longitudinal of the rocker-shaft, and a reverse-screw F, all parallel with the record-roll B. To stop the machine, or at least the travel of the reproducer H as the lever G is carried upon the enlargements *d* of the feed-roll D, I attach a lever M to one end of the rocker-shaft E and arrange for carrying and holding it securely either side of the perpendicular by a link N, pivoted to the end of the lever M and the opposite end connected with a spring, as P, so that the lever M will be firmly held either in the position of the solid lines or of the dotted lines in Fig. 2, as the case may be, thus carrying and holding the reproducer to or from the record, as may be desired and as indicated in Fig. 2. To stop the machine as the lever is carried over by the knife *g* (shown in dotted lines in Fig. 3) climbing the enlargements *d* on the feed-screw, I have provided a ratchet-wheel K and a pawl O, pivoted to the frame in position to engage the same, so that it cannot turn when the reproducer H is in the position shown by the solid lines in Fig. 2; but the pawl is thrown out of engagement with the ratchet when the lever M and the reproducer are thrown to the opposite position by the hub of the lever pressing it back, as indicated by the dotted lines, as shown in Fig. 5, so that the ratchet may revolve and allow the wheel J to revolve, and with it the feed-screw D, which transmits motion to the return feed-

screw F through the medium of the chain I or other suitable mechanism, and when the slide G' is carried to the end of the rocker-shaft E after having traversed the entire length of the record-roll the slide coming in contact with the pin or other suitable catch, as *r*' on the trip-rod R, may carry the end of the rod to position to hold the pawl from engaging the ratchet-wheel K, as shown in Figs. 5 and 6, so that when the lever G is carried over and the knife is thrown from contact with the feed-screw D, so that the other end engages the return feed-screw F, the lever and reproducer will be carried back to the opposite end of the rocker-shaft, when contact with the pin *r*' will disengage the pawl O by withdrawing the trip-rod R from behind it and allow it to again engage the ratchet-wheel K and stop the machine.

The carriage C is designed to carry several of the record-rolls B and may be moved to and from the reproducer H by the screw Q or any other suitable mechanism.

The lever G carries the reproducer H at one end, and the horn of the machine may be carried at the other end, though I do not deem it necessary to show the horn for the purpose of this invention.

While it is possible to cut the screw-thread of the feed-screw D of equal depth both upon the body of the screw and over the enlargements *d*, I find it much less difficult to cut them so that the bottoms of the threads will be uniform the entire length of the screw—that is, the screw-threads, or rather the furrows between the threads, are cut deep enough in the enlargements, so that the diameter of the metal at the bottom of the furrows will be uniform regardless of the diameter of the outer edges of the threads.

While so elaborate a description of the mechanism of the phonograph is not necessary to render the action of the feed-screw plain, as the feed-screw is designed for other lines of mechanism, I deem it desirable for a clear understanding of its application not only to the phonograph, but to other machines as well.

C' represents the track upon which the carriage C is supported, and L represents a motor for driving the several parts of the phonograph, the same being represented as connected by a belt with the gear-wheel J, which is secured to the feed-screw D and is coupled to drive the ratchet-wheel K, and *n n* are stops for the lever M, preventing it from passing beyond the desired position when being actuated by the variable feed-screw D and the spring P and link O.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a machine having movable parts, a feed-screw shaft having enlargements at intervals, the shaft and the enlargements being

uniformly threaded, as described and for the purpose set forth.

2. A machine having movable parts comprising a feed-screw shaft having enlargements at intervals, both the shaft and the enlargements being uniformly threaded, and a lever and knife to engage and be actuated by said feed-screw, substantially as and for the purpose set forth.

3. A machine having movable parts comprising a feed-screw shaft having enlargements at intervals, both the shaft and the enlargements being uniformly threaded, a rocker-shaft in position to engage the feed-screw shaft, substantially as and for the purpose set forth.

4. A machine having movable parts comprising a feed-screw shaft having enlargements at intervals, the shaft and the enlargements being uniformly threaded, a rocker-shaft, a sliding lever on said rocker-shaft in position to engage the feed-screw shaft, and a lever, a link and a spring connected to hold said rocker-shaft to position, substantially as and for the purpose set forth.

5. A machine having movable parts comprising a feed-screw shaft having enlargements at intervals, the shaft and the enlargements being uniformly threaded, a rocker-shaft, a lever slidingly mounted on said shaft and engaging the feed-screw shaft, an actuating-lever, a link and a spring connecting the rocker-shaft and the machine, and driving mechanism connected with the machine, substantially as and for the purpose set forth.

6. A machine having movable parts comprising a feed-screw shaft having enlargements at intervals, the shaft and the enlargements being uniformly threaded, a rocker-shaft, a lever slidingly supported on the rocker-shaft, in position to engage the threads on the feed-screw shaft an actuating-lever, a link and a spring connecting with the rocker-shaft and the machine, a reverse-feed-screw shaft, and driving mechanism, substantially as described.

7. A machine having movable parts comprising a feed-screw shaft having enlargements at intervals, the shaft and enlargements being uniformly threaded, a return-feed-screw shaft, a rocker-shaft between the feed-screw shaft and the return-feed-screw shaft, a lever slidingly supported on the rocker-shaft and arranged to alternately engage the feed-screw shaft and the return-feed-screw shaft a lever, link and spring for actuating the rocker-shaft, driving mechanism, and a pawl and a ratchet-wheel connected therewith, substantially as shown and described.

8. A machine having movable parts comprising a feed-screw shaft having enlargements at intervals, said shaft and enlargements being uniformly threaded, a return-screw-feed shaft, a rocker-shaft between the

feed-shaft and the return-feed shaft, a lever slidingly mounted on the rocker-shaft to alternately engage the feed-screw shaft and the return-feed-screw shaft, a lever, a link and a spring connected to actuate the rocker-shaft, driving mechanism, a ratchet-wheel and a pawl connected therewith, the pawl actuated by the rocker-shaft, a trip-rod parallel with the rocker-shaft and in the line of travel of

the pawl, and trips on the trip-rod in position to engage the lever on the rocker-shaft, substantially as shown.

Signed at Grand Rapids, Michigan, November 22, 1904.

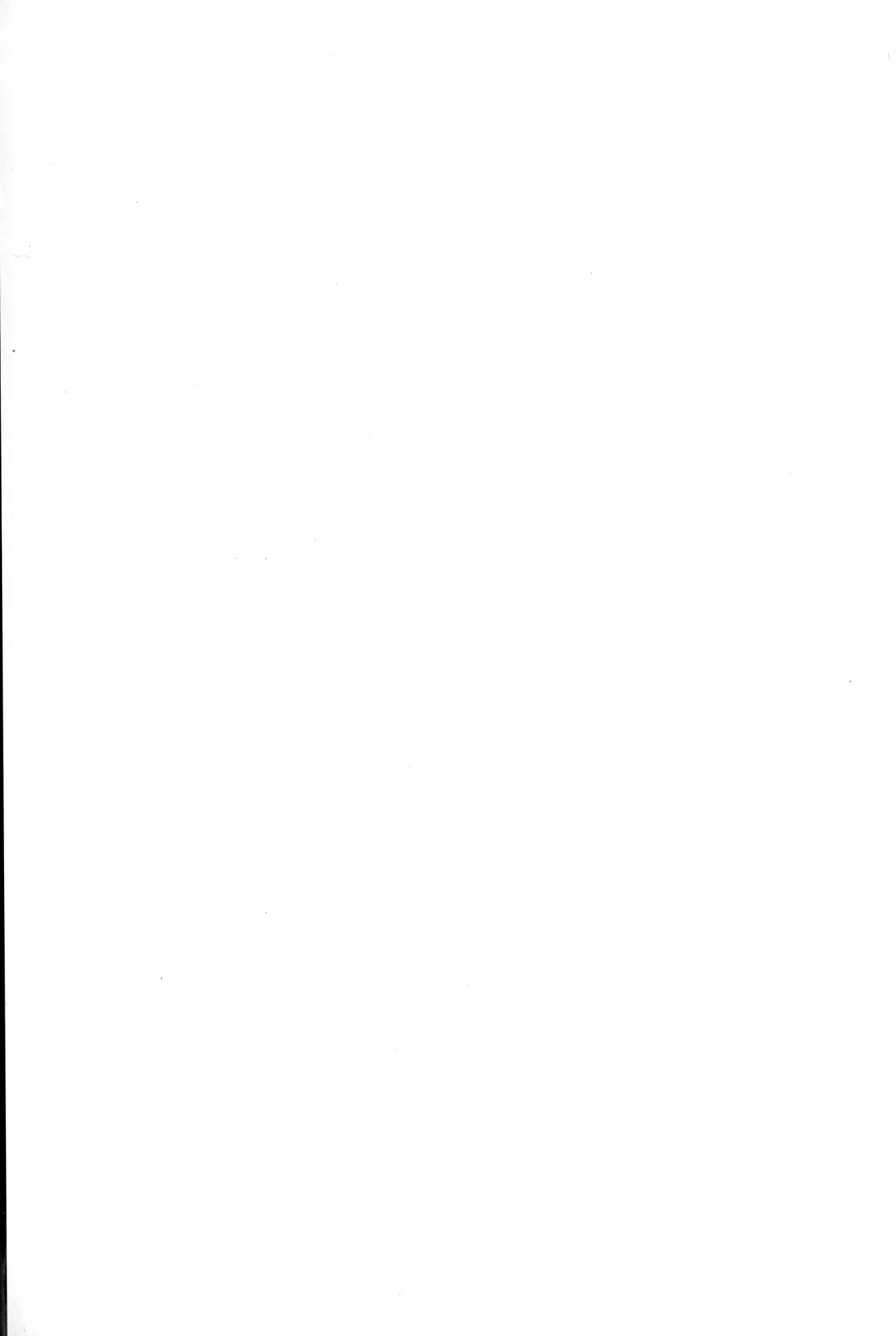
JOHN C. DUNTON.

In presence of—

GEORGIA E. CILLEY,

ITHIEL J. CILLEY.





A. L. IRISH.
SOUND REPRODUCER.
APPLICATION FILED MAY 2, 1904.

FIG. 1.

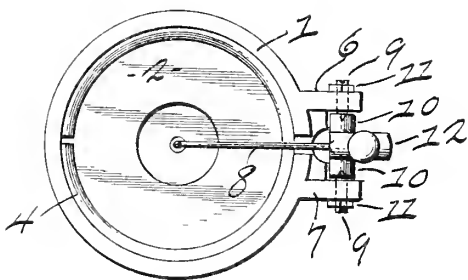


FIG. 2.

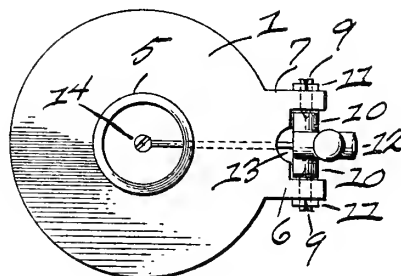
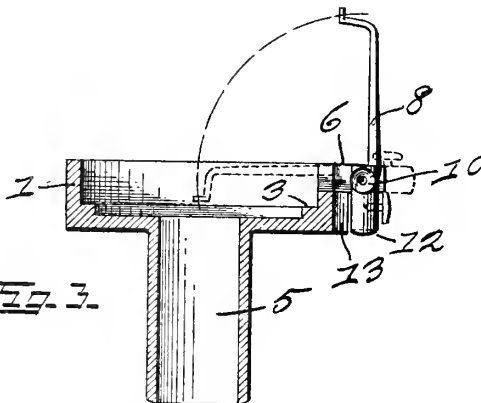


FIG. 3.



WITNESSES

Engel Guinner
A. V. Adams

INVENTOR.

Albert L. Irish
By C. H. Keller atty.

UNITED STATES PATENT OFFICE.

ALBERT L. IRISH, OF TOLEDO, OHIO, ASSIGNOR TO THE TALK-O-PHONE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

SOUND-REPRODUCER.

No. 797,516.

Specification of Letters Patent.

Patented Aug. 15, 1905.

Application filed May 2, 1904. Serial No. 205,881.

To all whom it may concern:

Be it known that I, ALBERT L. IRISH, of Toledo, county of Lucas, and State of Ohio, have invented certain new and useful Improvements in Sound-Reproducers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form part of this specification.

My invention has reference to a sound-reproducer for talking-machines; and it has particular reference to improvements in the details of construction whereby the various parts may be assembled with increased facility and with a greater degree of precision than has been attained heretofore in the art.

In carrying out my invention I provide means whereby the pivoted arm of the reproducer, adapted to connect with the diaphragm of the instrument, may be turned upon its pivotal connections completely out of the way of the operator while the diaphragm is being placed in position or is being removed therefrom for the purpose of effecting repairs. By means of my improved construction the pivoted arm may be effectively adjusted upon its pivots and its proper alinement for connection with the diaphragm insured before its final connection therewith is accomplished.

In the construction of my reproducer I have entirely eliminated the employment of springs of any character whatever, the resulting construction comprising a minimum number of parts and combining simplicity, durability, and effectiveness.

In the fulfilment of my invention I employ the novel combination, arrangement, and details of construction hereinafter shown, described, and claimed.

In the accompanying drawings, illustrative of my invention, Figure 1 is a front face view of a sound-reproducer embodying my improved construction. Fig. 2 is a rear view of the same. Fig. 3 is a transverse section thereof.

Referring to the details of construction, 1 indicates the shell of the reproducer, adapted to hold the mica disk or diaphragm 2 about its marginal edges in the usual manner, the shell being provided with a shoulder 3 to sup-

port the same in proper position. The diaphragm is held in contact with the shoulder by means of a split ring 4, adapted to be forced into the shell and by its resiliency engage the inner walls thereof.

5 is the usual hollow cylindrical extension upon the shell, adapted to connect with the horn of the talking-machine. Projecting outwardly at one side of the shell and extending beyond its periphery are two parallel supports 6 and 7, disposed apart and adapted to pivotally support an arm 8 between them. The means for pivoting the arm comprise conically-pointed screws 9, extending through the supports 6 and 7 and arranged in line with each other, with the pointed ends projecting into the space between the supports, and oppositely-disposed extensions or trunnions 10 upon the arm 8, provided with conical recesses adapted to receive the pointed ends of the screws 9.

11 represents lock-nuts upon the screws 9, adapted to contact with the outer faces of the supports 6 and 7 and lock the screws against rotation after they have been properly adjusted.

12 is a rearwardly-extending socket integral with the arm 8, the same being provided with the usual axial perforation and set-screw to secure the usual pointed pin in position therein.

13 is an inwardly-extending recess in the shell between the arms 6 and 7, adapted to permit the unobstructed turning of the arm 8 upon its pivotal connection at right angles to the plane of the diaphragm to permit the arm to assume a position perpendicular to the diaphragm.

The advantages of my improved construction will be apparent upon assembling the various parts in proper adjusted relation to each other. In performing this operation the arm 8 is mounted between the extended supports 6 and 7, the same being properly adjusted by manipulating the pointed screws 9, the nuts 11 being then turned to lock the screws against rotation. When thus supported, the arm 8 may be readily swung about upon its pivotal connections in a plane transverse to the plane of the diaphragm, taking the position in full lines, Fig. 3. The diaphragm may now be placed in position in the initial assembling of the parts, or the same may be conveniently removed should it become necessary to replace the same. The placing

of the diaphragm in position is accomplished without in the least interfering with the adjustment of the arm 8. It is to be observed that the pivoted arm 8 may be adjusted in a transverse direction upon its pivotal connection by manipulating the screws 9 so that the proper registry of the free end of the arm with the center of the diaphragm is readily accomplished, the connection with the diaphragm being usually effected by providing a central aperture therethrough through which a screw 14 engages the end of the operating-arm.

It will be seen from the foregoing description that a sound-reproducer constructed in accordance therewith will be extremely simple, that the parts thereof may be readily adjusted with relation to each other, and that the placing or replacing of the diaphragm is accomplished with facility and despatch and without disturbing the adjustment of the other parts of the instrument.

Having described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

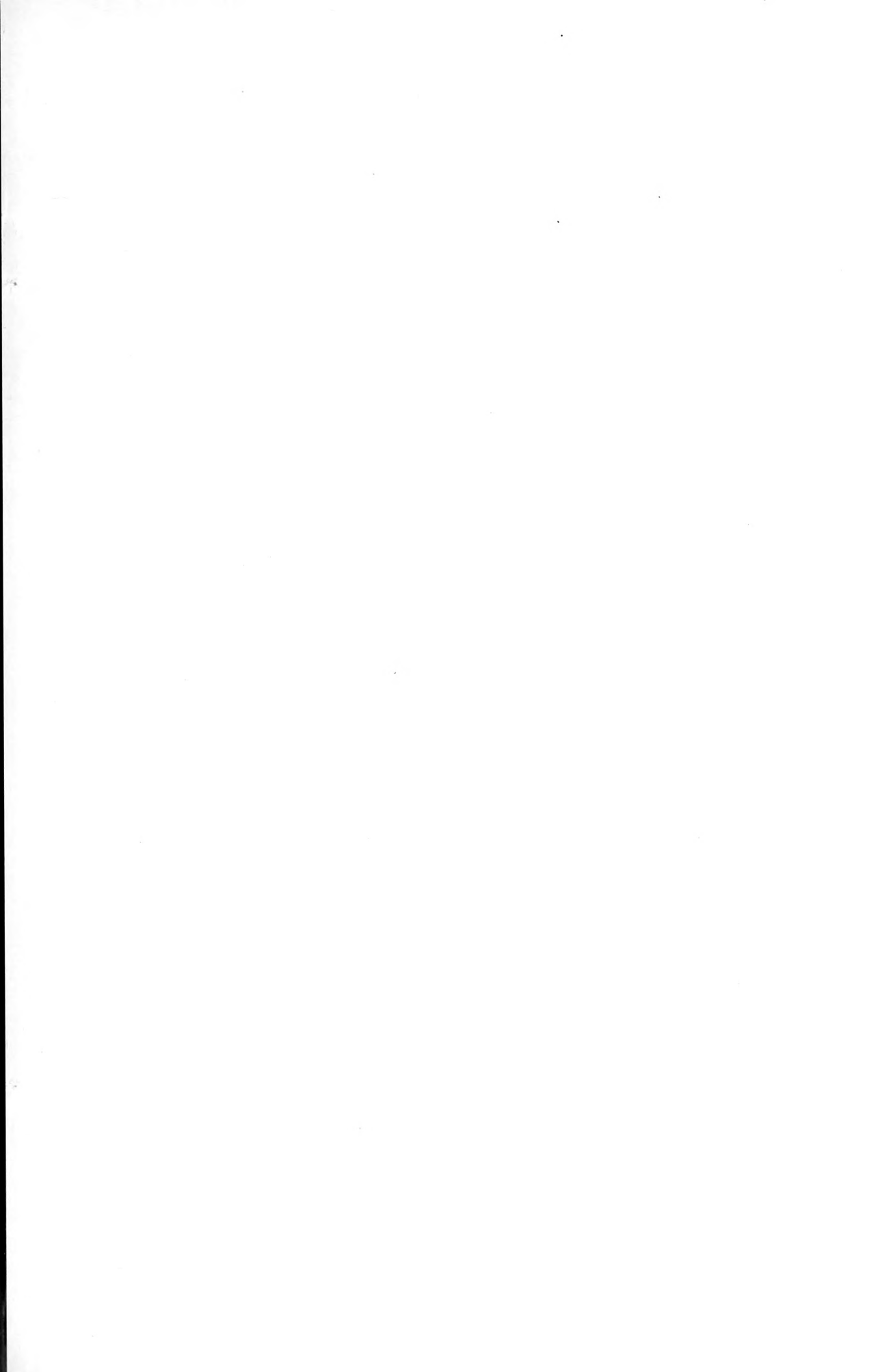
In a sound-reproducer, a shell provided with extended parallel supports and inclosing a diaphragm, adjusting-screws having cone-shaped ends extending inwardly from said supports, and an arm connected at one end with the diaphragm and provided on opposite sides with recesses adapted to receive the cone-shaped ends of the adjusting-screws, said shell having an inwardly-extending recess between the parallel supports to permit said arm to be turned to assume a position perpendicular to the diaphragm substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ALBERT L. IRISH.

Witnesses:

D. B. POTTS,
CARL H. KELLER.



No. 797,724.

PATENTED AUG. 22, 1905.

C. J. EICHHORN.
AMPLIFYING HORN.
APPLICATION FILED JUNE 14, 1904.

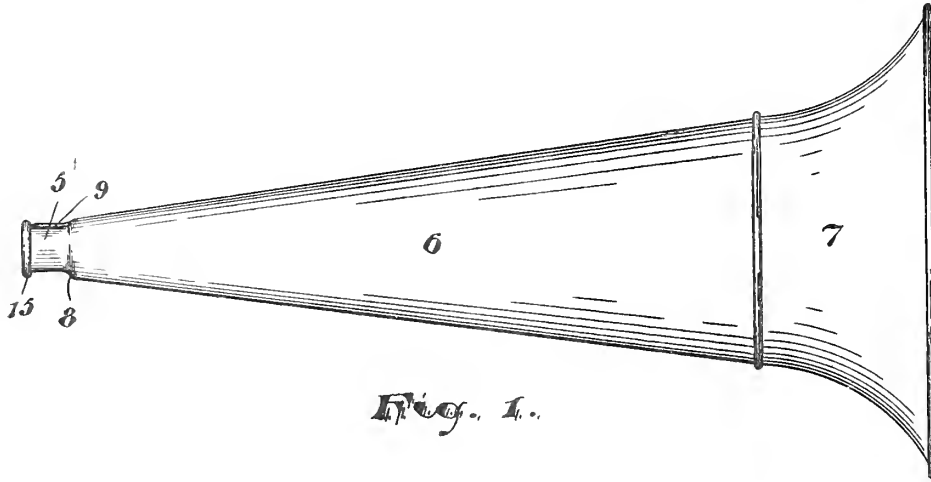


Fig. 1.

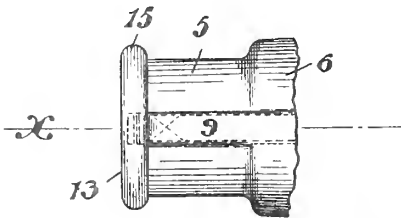


Fig. 2.

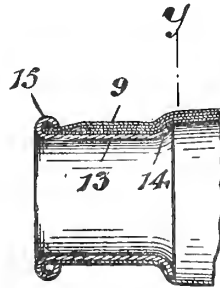


Fig. 3.

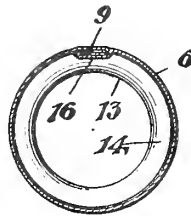


Fig. 4.

WITNESSES:

Ralph Lancaster

Russell M. Everett.

INVENTOR

Charles J. Eichhorn,

BY

Charles H. Pell

ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES J. EICHHORN, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE
TEA TRAY COMPANY, OF NEWARK, NEW JERSEY.

AMPLIFYING-HORN.

No. 797,724.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed June 14, 1904. Serial No. 212,509.

To all whom it may concern:

Be it known that I, CHARLES J. EICHHORN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Amplifying-Horns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

The objects of this invention are to secure greater stiffness and strength in an amplifying-horn at the smaller end thereof where it is coupled to a talking-machine, recording-machine, or similar apparatus or device, it being understood that such horns are usually attached and supported at their smaller end, the large end projecting in a horizontal direction away from the bearing or support to which the horn is secured.

Other objects are to enable the horns to be manufactured with greater facility and ease, to present a neat finish at the extremity, and to secure improved effects in the reproducing operations.

The invention consists in the improved amplifying - horn and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of the improved amplifying-horn. Fig. 2 is a detail plan of the smaller end thereof on an enlarged scale. Fig. 3 is a section taken through line *x* of Fig. 2, and Fig. 4 is a section taken through line *y* of Fig. 3.

In said drawings, 5 indicates the small tubular end of my improved horn. 6 is the flaring body thereof, which may be the frustum of a cone, and 7 indicates the bell end of the horn.

Heretofore the said small end of the horn has been made cylindrically tubular, as shown, after the sheet metal has been bent into approximately conical form and the longitudinal edges thereof connected or jointed.

This has been done by pressing the metal inward by means of dies or formers at points a little back or away from the smaller extremity of said flaring part, so as to form a shoulder 8 and so that the metal instead of being flaring, as at the beginning of the process, is cylindrical and is adapted to fit closely and properly upon or into the speaker-tube of the talking - machine or in connection with a large horn, so as to properly receive the rubber tube commonly employed in connecting said horn with the machine.

To secure greater stiffness and strength at the small end and at the same time to secure the desired result without materially increasing the cost, I form the flaring body and cylindrical end with a longitudinal seam at one side, as indicated at 9, the said seam being formed by bending the edges of the metal so that they interlock one edge with the other, as indicated in Fig. 4, the interlocking thickness of metal producing a rib of quite solid metal which gives increased strength and rigidity to the horn, especially where it is needed, to enable said small end to sustain the weight of the larger end.

In my improved construction the projecting rib is disposed by the tools employed in manufacturing it, so that at the body of the horn the said rib projects inward from the walls of the flaring body, as indicated in Fig. 4, while in the tubular or cylindrical smaller end 5 the said rib projects outwardly from the outer walls of said cylindrical portion. I thus secure increased strength of the tubular part where the supporting strain is brought upon the horn; but where the said horn is prominently in sight the outer surface is smooth, because of the projection of the rib being on the inside. Thus the said horn is rendered more sightly and neat in its appearance, as well as strong, and, furthermore, because of the outer projection of the rib the cylindrical part is made smooth on the inside, and the speaker-tube may fit within the said cylindrical part with greater neatness and nicety of adjustment and with greater firmness and security. To still further increase the strength of the smaller end of said horn, especially when the flaring body and small cylindrical end of one integral piece are of thin sheet metal, such as conduces to lightness and convenience in handling, I reinforce the said cylindrical part by means of an in-

ternal thimble or bracing-shell 13. (Shown more clearly in Figs. 3 and 4.) Said shell comprises a seamless tube which is inserted closely within the smaller cylindrical end against the interior walls thereof, and I lock the said tube within said smaller end by pressing outward the inner or forward end, as at 14, the pressing being accomplished by means of a spinning process or pressure provided by tools in any suitable manner. The opposite end of the said tube, shell, or thimble is turned outward and forward over the rear extremity of the smaller end, as at 15, thus giving neatness of finish to the extremity of the horn and avoiding the sharp and more or less ragged edges heretofore commonly provided in all horns of this class.

To enable the inner end of the bracing-shell to fit close against the flaring sides of the body 6, where said body connects with the cylindrical smaller end, I have formed a notch 16 in the flaring inner extremity of said shell to receive the rib. The said rib lying in said notch also serves to prevent the bracing-shell from turning within the smaller end.

Having thus described the invention, what I claim as new is—

1. The improved horn, herein described comprising a flaring body and a cylindrical small end integral with said body, and a tubular shell inserted within said cylindrical small end, the inner end of said shell being turned outwardly into flaring body and the opposite end being turned outwardly and forwardly over and around the extremity of said cylindrical small end, substantially as set forth.

2. The improved horn herein described comprising a flaring body and a cylindrical small end, a shoulder being formed interiorly at the junction of the cylindrical and flaring walls, and a tubular shell extending at one end into the flaring body and thereat being bent outwardly against said shoulder and at

the opposite end projecting out from said cylindrical small end and being outwardly bent to engage the rear extremity of said small end substantially as set forth.

3. The improved horn having a longitudinal seam formed by turning and interlocking the opposite edges of said horn, said horn having a cylindrical small end and a flaring large end, the said longitudinal rib projecting outward at the cylindrical part and inward at the flaring part, substantially as set forth.

4. The improved horn having a longitudinal seam formed by turning and interlocking the opposite edges of said horn, said horn having a cylindrical small end and a flaring large end, the said longitudinal rib projecting outward at the cylindrical part and inward at the flaring part, and a shell or thimble inserted in said small cylindrical end and having its forward end notched and pressed outward against the flaring sides of the horn, substantially as set forth.

5. The improved horn having a longitudinal seam formed by turning and interlocking the opposite edges of said horn, said horn having a cylindrical small end and a flaring large end, the said longitudinal rib projecting outward at the cylindrical part and inward at the flaring part, and a shell or thimble inserted in said small end and having a notched forward end, into the notch of which the said rib lies and having an outwardly and forwardly curved rearward end covering the extremity of the said cylindrical small end of the horn, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 27th day of May, 1904.

CHARLES J. EICHHORN.

Witnesses:

CHARLES H. PELL,
RUSSELL M. EVERETT.



No. 797,725.

PATENTED AUG. 22, 1905.

C. J. EICHHORN.
AMPLIFYING HORN.
APPLICATION FILED JUNE 14, 1905.

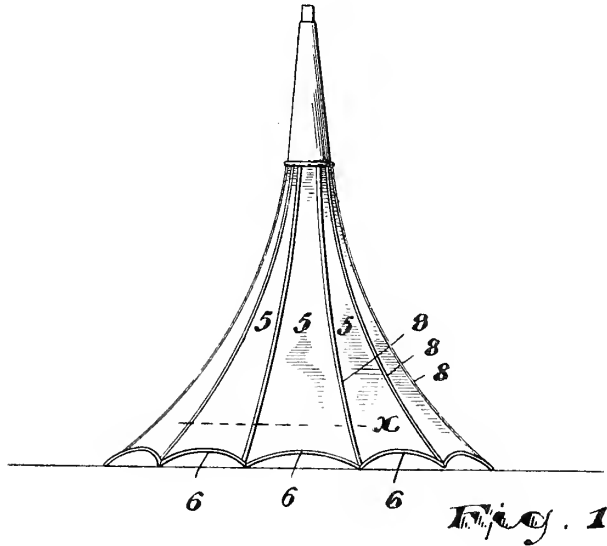


Fig. 2.

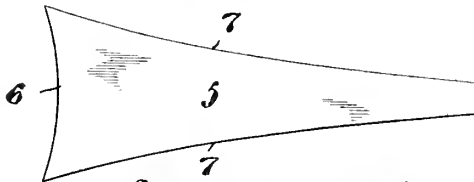
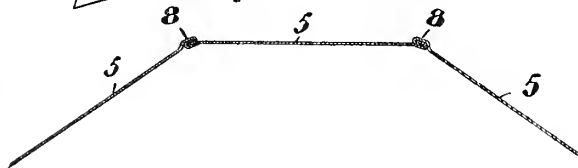


Fig. 3.



WITNESSES

Ralph Lancaster
Russell M. Everett.

INVENTOR

Charles J. Eichhorn

BY

Charles H. Pell

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES J. EICHHORN, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE
TEA TRAY COMPANY, OF NEWARK, NEW JERSEY.

AMPLIFYING-HORN.

No. 797,725.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed June 14, 1905. Serial No. 265,291.

To all whom it may concern:

Be it known that I, CHARLES J. EICHHORN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Amplifying-Horns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

The objects of this invention are to secure greater strength and rigidity at the large end of the horn, more particularly in what are known as "flower-horns," whereby said horns will be better able to maintain their flower shape while in transportation and in use.

Heretofore flower-shaped horns have had their projecting petals at the large end of the horn project beyond the termination of the ribs by which the sections of the horn have been held together. Thus the said petals, made from thin sheet material, were lacking in stiffness and were very easily bent, particularly when the horn stood upon its large end, as indicated in Figure 1 of the drawings, the bending and indenting of the weak petals greatly marring the appearance of the horn, so that it became unmarketable in the hands of the retail dealer. By my construction I secure a flower-shaped horn which is materially stronger to resist downward pressure.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts in each of the several figures, Fig. 1 is a side elevation of my improved horn, and Fig. 2 is a plan of one of the longitudinal sections thereof, and Fig. 3 is an enlarged section of the same taken at line *x*, Fig. 1.

In said drawings, 5 5 indicate the sections

of the horn, which individually are flaring in plan and at their large ends are made concave, as at 6. The longitudinal edges 7 of said sections are also concave, so that when said sections are joined together the horn will be given the desired flaring and regularly scalloped shape at the edge of the large end, resembling a flower.

The sections 5 5 are joined together at their longitudinal edges by doubling the overlapping edges to form thick longitudinal ribs 8 8 8, which extend to the points of greatest projection of the petals. Thus the ribs 8 8 come in contact with the ground while the center parts of the sections are raised from the ground, and so are protected from bending or indentation.

Having thus described the invention, what I claim as new is—

1. The improved horn herein described, comprising a series of longitudinal sections joined together at their longitudinal edges, said longitudinal edges being concaved in plan and the large end edges of said sections being also concave, the joints of the said horn projecting beyond the center portions of the ends of said sections.

2. The improved horn herein described comprising longitudinal sections joined together at their longitudinal edges, the said longitudinal edges overlapping and being doubled together to form ribs, and the said ribs extending, at the large end of the horn, beyond the centers of the ends of the said sections and being adapted to take the weight of the horn when the latter stands upon its large end.

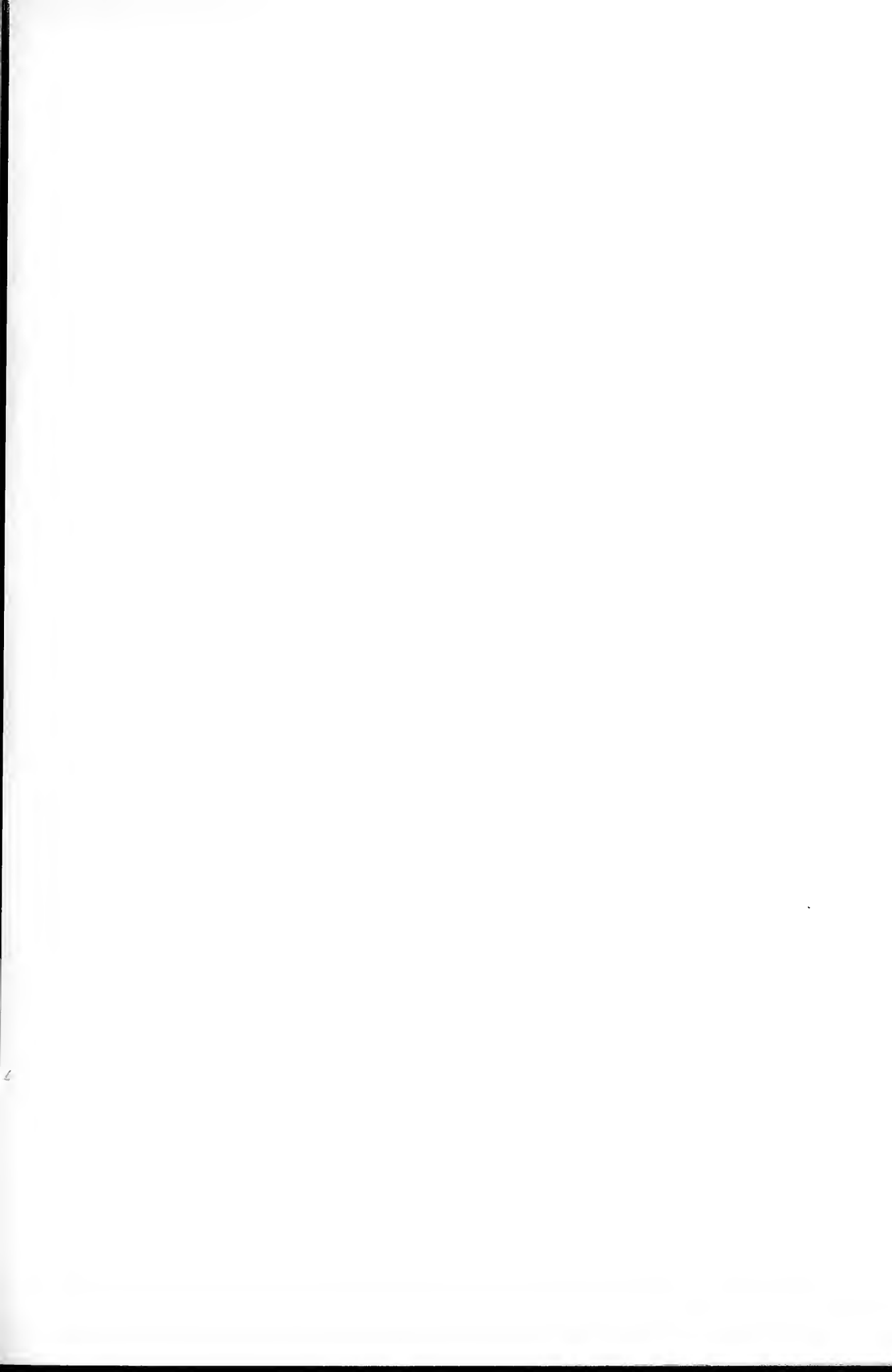
In testimony that I claim the foregoing I have hereunto set my hand this 8th day of June, 1905.

CHARLES J. EICHHORN.

Witnesses:

CHARLES H. PELL,
CLEMENT BEECROFT.





H. S. MILLS.
PHONOGRAPH.

APPLICATION FILED DEC. 21, 1904.

Fig. 1.

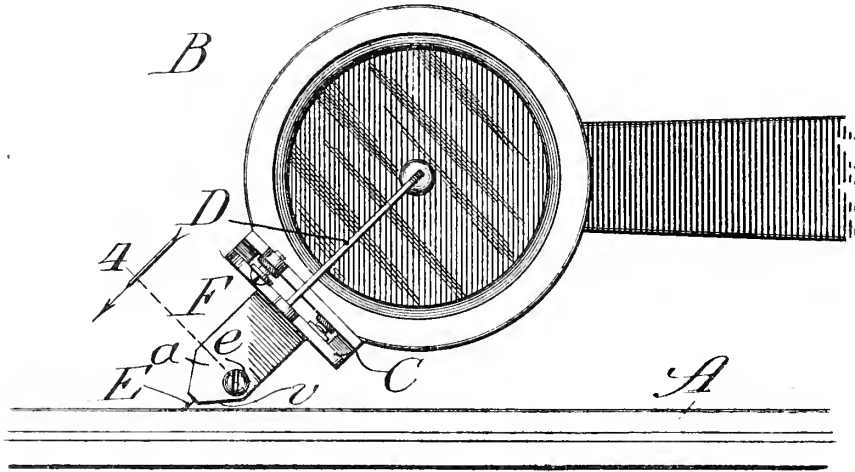


Fig. 3.

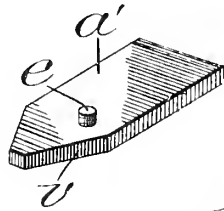


Fig. 2.

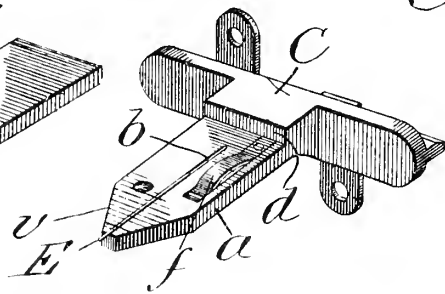
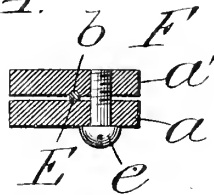


Fig. 4.



Witnesses:
Ed. Chyford.
John Enders.

Inventor:
Herbert S. Mills.
By Dymally, Dymally & Lee,
Attys.

UNITED STATES PATENT OFFICE.

HERBERT S. MILLS, OF CHICAGO, ILLINOIS.

PHONOGRAPH.

No. 797,813.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed December 21, 1904. Serial No. 237,796.

To all whom it may concern:

Be it known that I, HERBERT S. MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Phonographs, of which the following is a specification.

My invention relates more particularly to means for supporting the stylus proper in the form of an attenuate length of wire on the reproducer of the type of phonograph or analogous instrument under different names, employing for the record a rotary disk, the degree of attenuateness of the wire, which is of uniform or substantially uniform thinness throughout, being such as to cause it to present always to the record-grooves an adequately fine point as it wears away with use by frictional contact with the grooves. This fine wire is too yielding to adapt it for use without support, since by undue bending in traversing the record it mars the reproduction and renders it indistinct. For supporting the wire I have provided a species of rigid clamp on the reproducer, the function of which is to hold the wire in a manner to permit protrusion thereof at one end to the desired short distance beyond the clamp for engagement with the record and to hold the wire throughout the remainder of its extent so firmly and uniformly as to render it practically an integral part of the rigidly stable clamp, and thus prevent any independent vibration or movement of the wire which would tend to mar or destroy its stylus action.

In the accompanying drawings, Figure 1 is a broken view showing in side elevation the reproducer of the class of instrument hereinbefore specified equipped with my improvement and in operative position relative to the record-disk; Fig. 2, a perspective view showing one jaw of my improved clamp projecting from the bracket of the reproducer which carries the vibration-transmitting finger; Fig. 3, a similar view of the other jaw of the clamp, and Fig. 4 a section taken at the line 4 on Fig. 1 and viewed in the direction of the arrow.

A denotes a disk-record, and B the reproducer-head of a known type of phonograph. On the bracket C, which is fastened, as usual, to the edge of the reproducer-head and carries the transmitting contact-finger D, is formed a flat jaw *a*, shown beveled at *v* toward the end on the edge which comes adjacent to the record-surface and also shown

beveled correspondingly on the opposite edge for the sake of symmetrical appearance. A groove *b* is formed in the longitudinal center of the face of the jaw *a* to extend from the outer end thereof, (shown as an apex because of the beveled edges,) the depth of the groove being preferably about one-half the thickness of the wire E, forming the stylus proper. The companion jaw *a'*, which is shown to be of the same shape as the jaw *a* to cooperate therewith and form the clamp F, fits at its butt-end against a shoulder *d* on the face of the bracket C and carries a screw *e* to enter a screw-hole *e'* in the jaw *a* for securing the jaws flatwise together with a spring *f* interposed between them and shown to be provided on the jaw *a*. The purpose of the spring is to tend to separate the jaws when their fastening-screw *e* is loosened for the purpose hereinafter explained in the event of their surfaces adhering together.

With the jaws *a* and *a'* secured together they clamp the wire E in its groove so firmly and uniformly between them as to render it solid with the clamp and preclude the possibility of any movement of the extent of wire between the jaws, while the protruding section thereof permits the point to engage the record-surface. As the protruding section, which need not project more than about one thirty-second of an inch beyond the clamp, wears down with use the jaws may be separated by loosening the screw *e* to permit the wire to be drawn out far enough to compensate for the wear, when the jaws are to be fastened together again, or the same opening of the jaws sufficiently exposes the entrance end of the groove to facilitate the introduction into place in the clamp of a new wire E to be fastened in position as described. If it is not intended that the user shall have opportunity to draw out the wire to compensate for wear on the point, but that a new one shall be substituted for the old when worn down in its initial setting, the replacing to be left to a repairer, the screw may be immovably secured by means of solder or otherwise, requiring the use of a suitable tool for opening the jaws.

In practice I have used a single setting of the stylus-wire in the clamp several hundred times in a music-producing phonograph of the type herein represented without deterioration in the sound of the instrument. In fact, my device seems to improve the tone quality of the instrument by rendering it more mellow

and softer, the latter quality being particularly desirable in a coin-operated phonograph, for which connection I have more especially devised my improvement.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the reproducer-head of a phonograph, a clamp comprising a flat-faced jaw connected with said head to project therefrom and containing in its face a longitudinal groove extending to its outer extremity to receive the attenuate wire forming the stylus, and a companion jaw removably fastened flatwise on said first-named jaw to hold said stylus rigidly in place with one end protrudingly presented to the record.

2. In combination with the reproducer-head of a phonograph, a clamp comprising a flat-faced bevel-edged jaw connected with said head to project therefrom and containing in its face a longitudinal groove extending to the extremity of the bevel to receive the attenuate wire forming the stylus, and a bevel-edged companion jaw removably fastened flatwise on said first-named jaw to hold said stylus rigidly in place with one end protrudingly presented to the record.

3. In combination with the reproducer-head of a phonograph, a clamp comprising a flat-faced bevel-edged jaw connected with said head to project therefrom and containing in its face a longitudinal groove extending to the extremity of the bevel to receive the attenu-

ate wire forming the stylus, a bevel-edged companion jaw removably fastened flatwise on said first-named jaw to hold said stylus rigidly in place with one end protrudingly presented to the record, and a spring compressible between said jaws tending to separate them.

4. In combination with the reproducer-head of a phonograph, a bracket on said head a clamp comprising a jaw forming an integral part of the bracket from which it projects and provided with a beveled edge and a longitudinal groove extending to its outer end to receive the attenuate wire forming the stylus proper, and a jaw secured on said first-named jaw to clamp said wire rigidly in place.

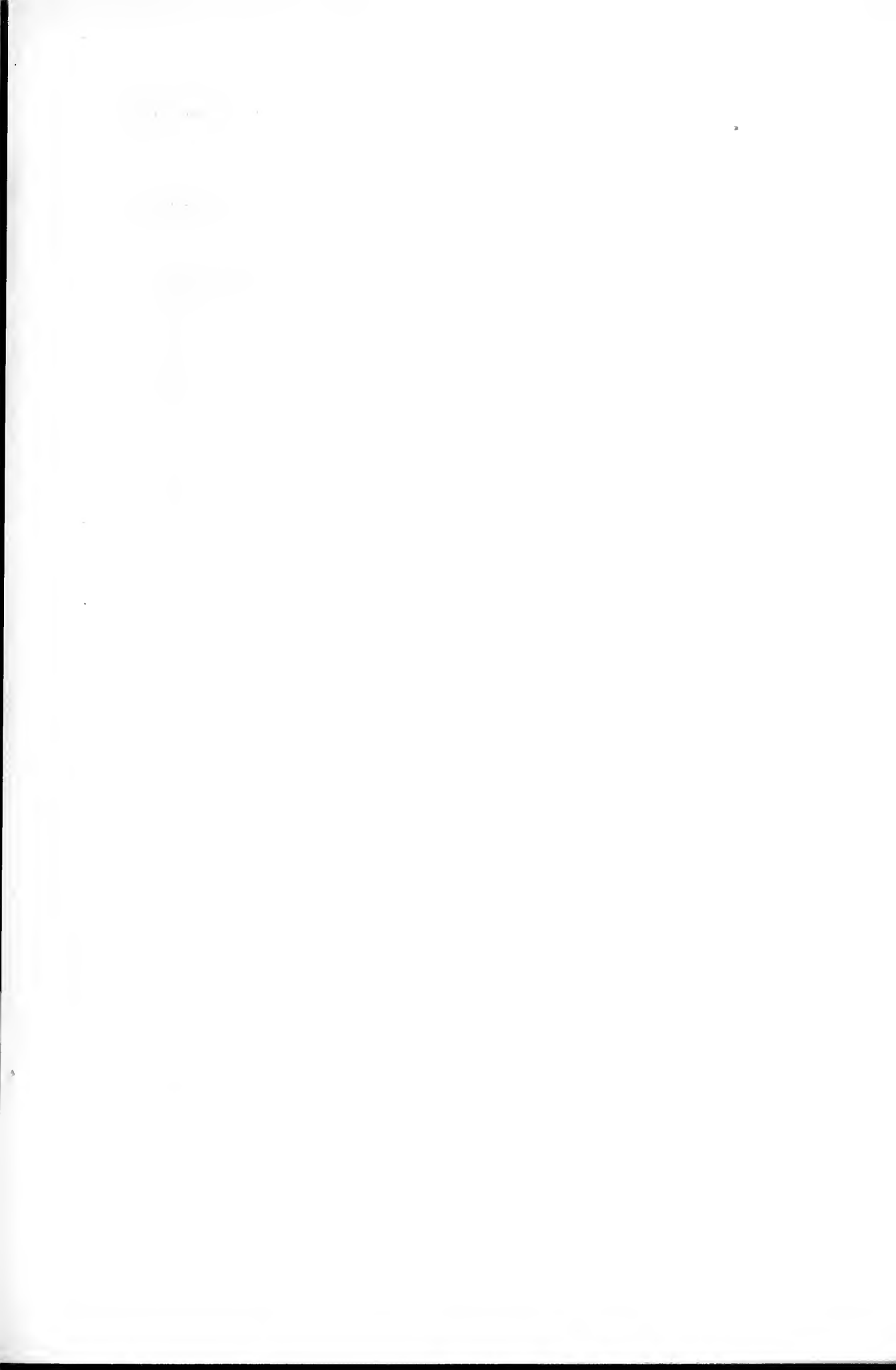
5. In combination with the reproducer-head of a phonograph, a bracket thereon a stylus composed of an attenuate wire, and a clamp on the head-bracket comprising a flat-faced metal jaw, provided with a shoulder on its face side, bevel-edged toward its outer end and containing a longitudinal groove in which said wire lies to project at one end beyond said jaw, and a removable flat-faced metal jaw conforming to said first-named jaw and fitting against the shoulder thereon, and means for securing the jaws together to hold said wire rigidly between them.

HERBERT S. MILLS.

In presence of—

L. HEISLAR,

J. H. LANDES.



No. 798,034.

PATENTED AUG. 22, 1905.

G. W. GOMBER.
TABLET CARRIER FOR TALKING MACHINES.
APPLICATION FILED JUNE 16, 1904.

2 SHEETS—SHEET 1.

Fig. 2.

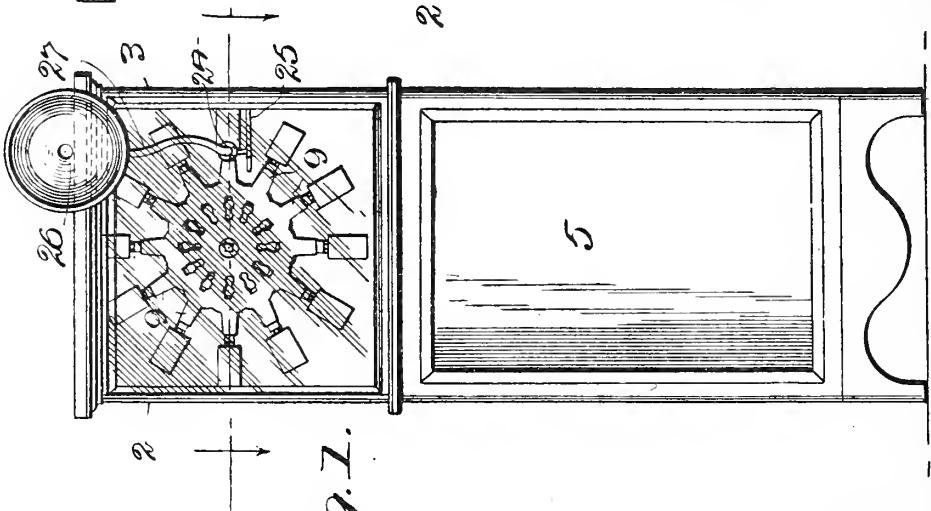
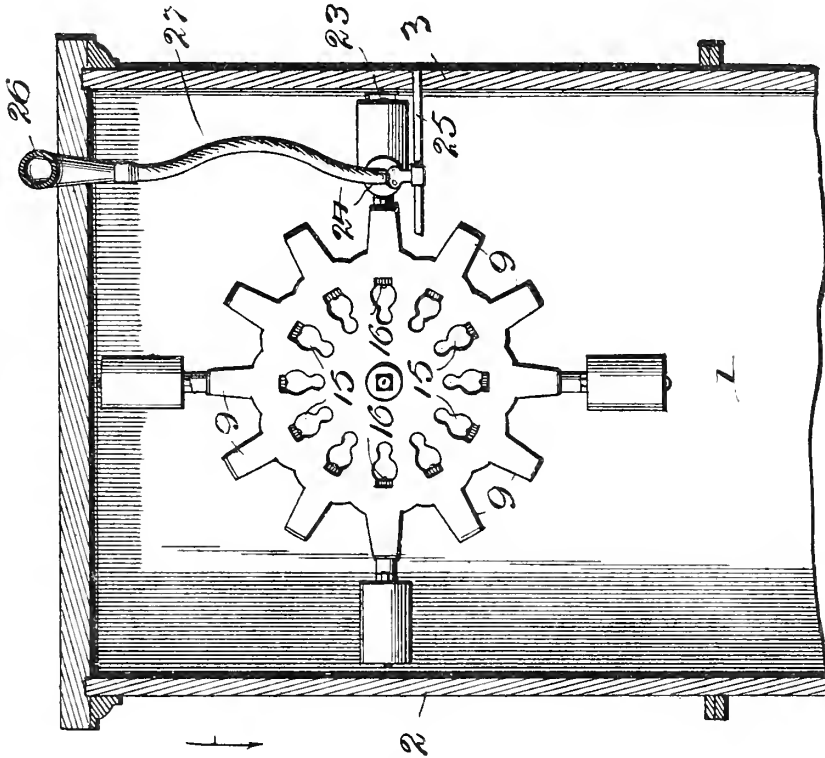


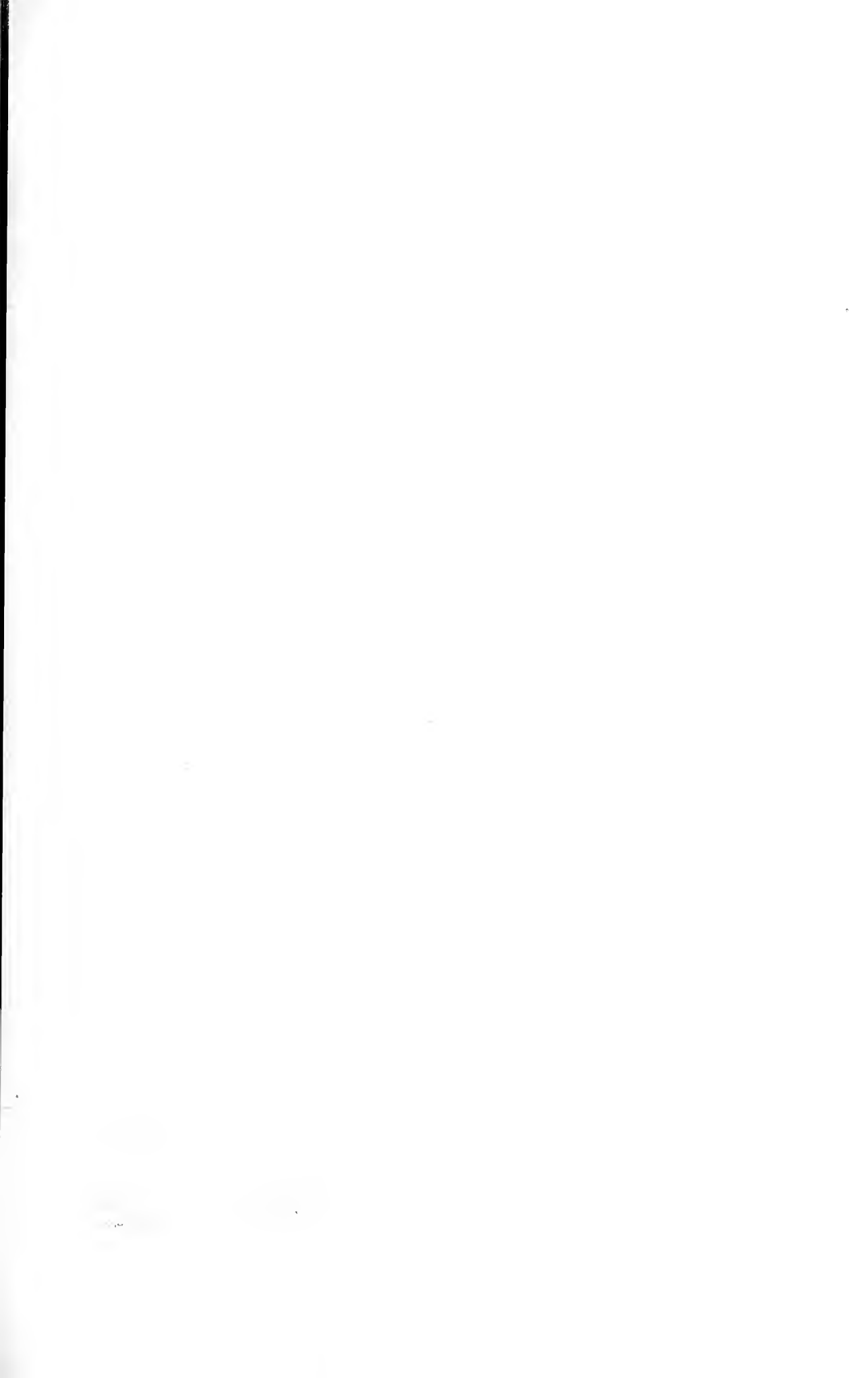
Fig. 1.

Witnesses

F. E. Barry.
W. Gould.

Inventor
Geo. W. Gomber.

W. J. Fitzgerald & Co.
Attorneys



G. W. GOMBER.
TABLET CARRIER FOR TALKING MACHINES

APPLICATION FILED JUNE 16, 1904.

2 SHEETS—SHEET 2.

Fig. 3.

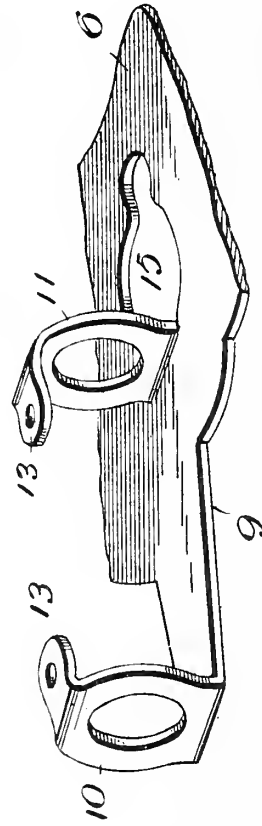
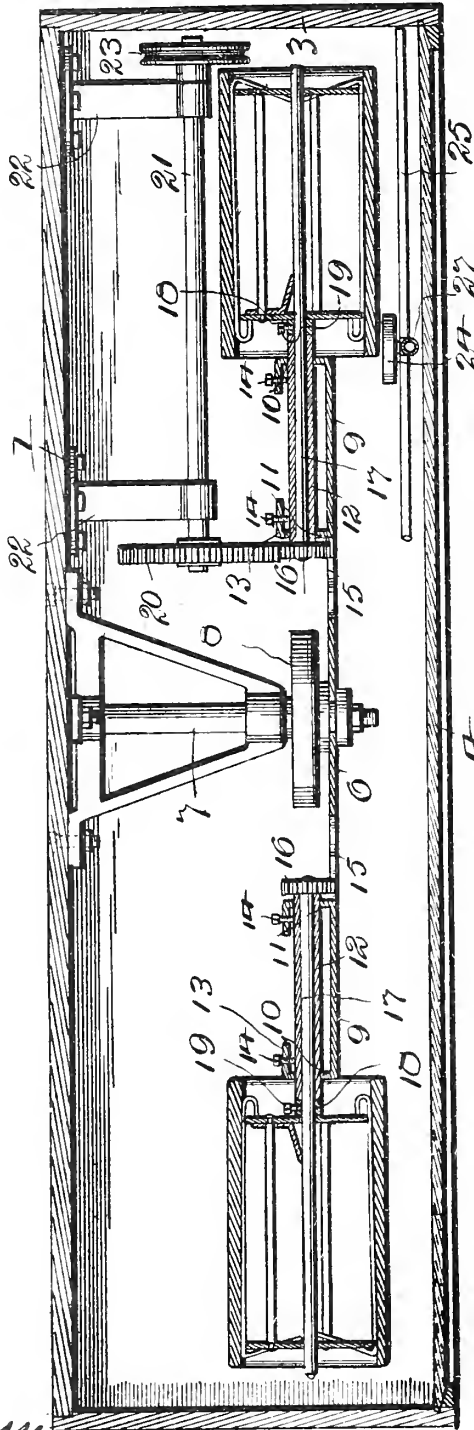


Fig. 4.

Witnesses

J. P. Barry
W. H. Gould

Inventor

Geo. W. Gomber

By

W. J. Fitzmaurice
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE W. GOMBER, OF CONYNGHAM, PENNSYLVANIA, ASSIGNOR TO
HULDA GOMBER, OF CONYNGHAM, PENNSYLVANIA.

TABLET-CARRIER FOR TALKING-MACHINES.

No. 798,034.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed June 16, 1904. Serial No. 212,842.

To all whom it may concern:

Be it known that I, GEORGE W. GOMBER, a citizen of the United States, residing at Conyngham, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Tablet-Carriers for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to phonographs, and more particularly to a tablet-carrier for talking-machines whereby a plurality of tablets or mandrels are grouped together in one machine so that any preferred one of said tablets may be readily moved into coöperation with the reproducer; and my invention consists of certain specified details of combination and construction of parts, the preferred form whereof will be hereinafter set forth, and pointed out in the claims.

The main object of my invention, among others, is to provide a simple form of carrier adapted to hold any preferred number of tablets or tablet-receiving mandrels within a minimum amount of space.

Other objects will be hereinafter presented, and attention is called to the accompanying drawings, which are made a part of this application, and in which—

Figure 1 shows a front elevation of my talking-machine complete. Fig. 2 is a similar view, on a slightly-enlarged scale, a portion of the casing being shown in section. Fig. 3 is a horizontal section of my machine, taken on the median line of my tablet-carrier. Fig. 4 is a perspective detail view of one of the mandrel-carrying arms of my magazine.

Referring to the numerals on the drawings, 1 indicates the rear of the casing, while 2 and 3 designate the sides thereof, the front portion of the upper section of the casing being preferably of glass, as designated by the numeral 4, while the lower part of the casing 5 may be made of any preferred material and adapted to contain the motor, as will be obvious.

Inasmuch as the claims hereunto appended are predicated upon the specific form of carrier illustrated and such modifications and substitutes thereof as fairly fall within the purview of my invention, I deem it unnecessary to dwell at any length upon the coöperating ac-

cessories of the tablet-carrier—as, for instance, the speaker or the motor—and means for mounting said parts in their operative positions.

My tablet-carrier may be likened unto a wheel with a plurality of radiating arms or spokes, to which latter are operatively connected the tablet-mandrels and means for rotating the same from a common source of power. While, therefore, my tablet-carrier may comprise a hub-section, I have in the present instance shown a suitable piece of sheet metal 6, which is rotatably mounted upon a suitable axle or support, as indicated by the numeral 7, said axle or shaft 7 being properly connected to the casing in any preferred way so that the forward free end thereof will project outward in a horizontal plane to be received by an aperture in the carrier-plate or hub 6, it being understood that the carrier is so mounted upon the shaft that it may be freely rotated thereon in either direction, as by means of the band-wheel 8, secured to a sleeve-like extension of the hub or plate, said wheel being placed in communication with a belting leading to any suitable means (not shown) of preferably manual actuation.

In the present instance it will be observed that the periphery of the plate or carrier-body 6 is cut away at intervals, so as to form the radially-disposed arms or extensions 9, and, as illustrated in Fig. 4, the outer ends of said arms are bent at right angles to form the bearing bracket or seat 10, and a corresponding bracket or bearing seat 11 is struck up from the material of the plate to form the inner support for the bearing-sleeve 12, the extreme ends of the bearing-seats 10 and 11 being fashioned and properly bent so as to provide the set-screw seats 13 for accommodating the set-screws 14, whereby said sleeve is locked in place. It is obvious, however, that these bearing-seats may be independently formed and suitably connected with the carrying wheel or disk in any preferred way, as by rivets; but this construction is not shown in the drawings. By striking up the inner bearing 11 from the plate an opening 15 is formed, and this opening is utilized to accommodate the periphery of the gear 16, which is secured to the shaft 17, operatively mounted in the sleeve 12, the outer end of said shaft being of sufficient length to receive any preferred form of mandrel, as clearly shown, a

locking-collar and coöperating set-screw 18 and 19, respectively, being disposed upon the shaft 17 at the outer end of the sleeve 12, whereby said shaft will be held against longitudinal movement. Inasmuch as the plurality of gears 16 (there being one for each mandrel, as will be observed) are thus disposed so that they will be moved in a common radial path around the axial center of the carrier 6, it follows that a common driving-gear 20 may be employed to actuate all of said gears as they are successively brought into mesh therewith. I therefore mount the common driver 20 upon a suitable shaft 21, having bearings in supporting-brackets 22, secured to part of the casing, while the opposite end of the shaft or any intermediate part thereof may be provided with the driving-wheel 23, placed in connection with the motor, as by belting, sprocket-chain, or the like. (Not shown.)

In Figs. 2 and 3 it will be observed that a speaker (designated by the numeral 24) is operatively mounted upon a suitable carrier 25, connected to a convenient part of the casing, and that said speaker is disposed in direct communication with the horn 26, or a flexible tube 27 may be employed to form the connecting-link between said parts, as preferred. It is therefore obvious that any suitable means may be employed to coöperate with the adjusting-wheel 8 to rotate the carrier in either direction, and thus bring any preferred tablet on the carrier into coöperative relationship with the reproducer or speaker 24, and I deem it unnecessary to specifically set forth any means for accomplishing this result, reserving for a future application or applications such specific means which I may decide to adopt for this purpose or for better carrying out other operations of the machine.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a phonograph a carrier adapted to carry a plurality of tablets, each of the tablets being disposed with its axis radiating from the axis of the carrier.

2. A tablet-carrier having a plurality of rotatable mandrel-receiving spindles, radiating from a common center and traveling in a common path when the carrier is rotated, as and for the purpose set forth.

3. A tablet-carrier consisting of a disk or wheel like member 6 having a plurality of rotating arms radiating from a common center and traveling in a common path when the carrier is rotated, as set forth.

4. A tablet-carrier comprising a wheel having a plurality of rotatable tablet-receiving mandrels, the axes of which radiate from a common point and are designed to move in a common path as set forth.

5. A tablet-carrier having a plurality of rotatable mandrel-receiving spindles radiating from the periphery of the carrier and disposed

to move in the same path when the carrier is rotated as set forth.

6. In a phonograph, a carrier for tablets having a plurality of spindles, the axes of which radiate from a common center, each spindle having suitable bearings in the carrier and means whereby they may be driven from a common source of power as set forth.

7. A tablet-carrier comprising a disk; means to rotatably mount the same and a plurality of rotatable mandrels on the disk the axes on the mandrels radiating from the disk and additional means to rotate all of said mandrels from a common source of power, as set forth.

8. In a machine of the character specified, a carrier for tablets; a plurality of extensions each extension having a rotatable spindle mounted thereon and adapted to carry a tablet, the axes of the spindles radiating from a common center, as set forth.

9. A tablet-carrier for phonographs comprising a hub and a plurality of spoke-like members radiating from the hub each spoke-like member being adapted to rotate and carry a mandrel thereon whereby all the mandrels will be moved in a common path when the hub is rotated, the axes of the mandrels radiating from the same point as set forth.

10. A rotating carrier for tablets having a plurality of radiating rotatable tablet-receiving mandrels, the axes of which radiate at any preferred angle to the axis of the carrier as set forth.

11. In phonographs or talking-machines, a carrier adapted to hold a plurality of rotatable tablets, said carrier consisting of a disk-like member or hub 6, the axes of the tablets on the carrier radiating therefrom and being disposed at any desired angle relative to the axis of the carrier as and for the purpose set forth.

12. In a machine of the character specified, a tablet-carrier; consisting of a disk-like plate 6; a plurality of bearing-seats struck up from the plate and arranged in pairs; a sleeve secured to each pair of said seats; a shaft rotatably mounted in said sleeve and designed to receive upon its extended end a tablet-mandrel and means to rotate said shaft and additional means to rotate the carrier in either direction whereby the tablets on the mandrels will be moved in a common radial path as and for the purpose set forth.

13. In a phonograph, a tablet-carrier adapted to hold any desired number of tablets and consisting of a plate or disk 6; integral bearing-seats struck up near the edge of said plate; rotatable shafts operatively mounted in said seats and adapted to receive on their outer ends a tablet-mandrel; means to successively or selectively rotate said shafts as set forth.

14. In a phonograph a tablet-carrier adapted to hold any desired number of tablets and consisting of a plate or disk like member 6; bearing-seats carried by said plate; radial ro-

tatable shafts operatively mounted in said seats and adapted to receive on their outer ends a tablet-mandrel, and means to successively or selectively rotate said shaft as and for the purpose set forth.

15. In a phonograph a carrier rotatably mounted in position and provided with a plurality of rotatable tablet-mandrels the axes of which radiate from the periphery of the carrier, all of said mandrels being disposed to travel in the same radial path and having their axes at an angle to the axis of the carrier as set forth.

16. In a phonograph a tablet-carrier having a plurality of rotatable mandrels disposed to travel in a common radial path; the axes of

the mandrels radiating at any preferred angle to the axis of the carrier as and for the purpose set forth.

17. In a phonograph a carrier adapted to carry a plurality of tablets in a common radial path, each of the tablets being disposed with its axis radiating at an angle to the axis of the carrier as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

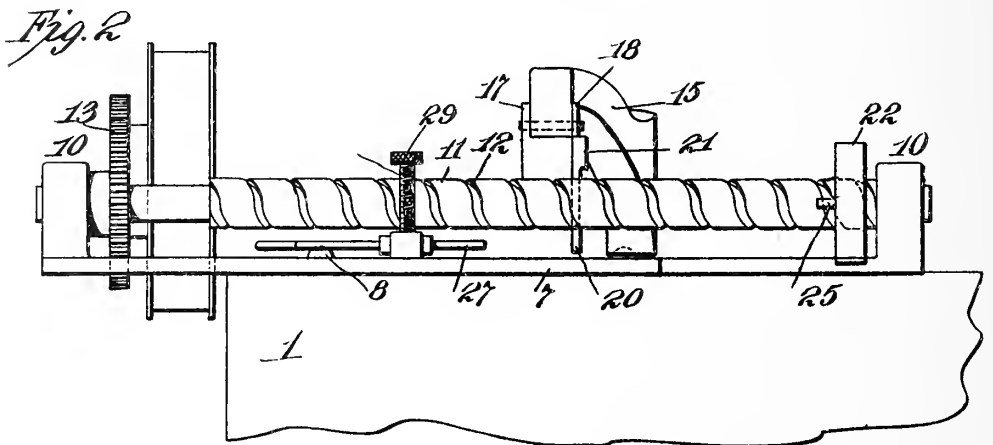
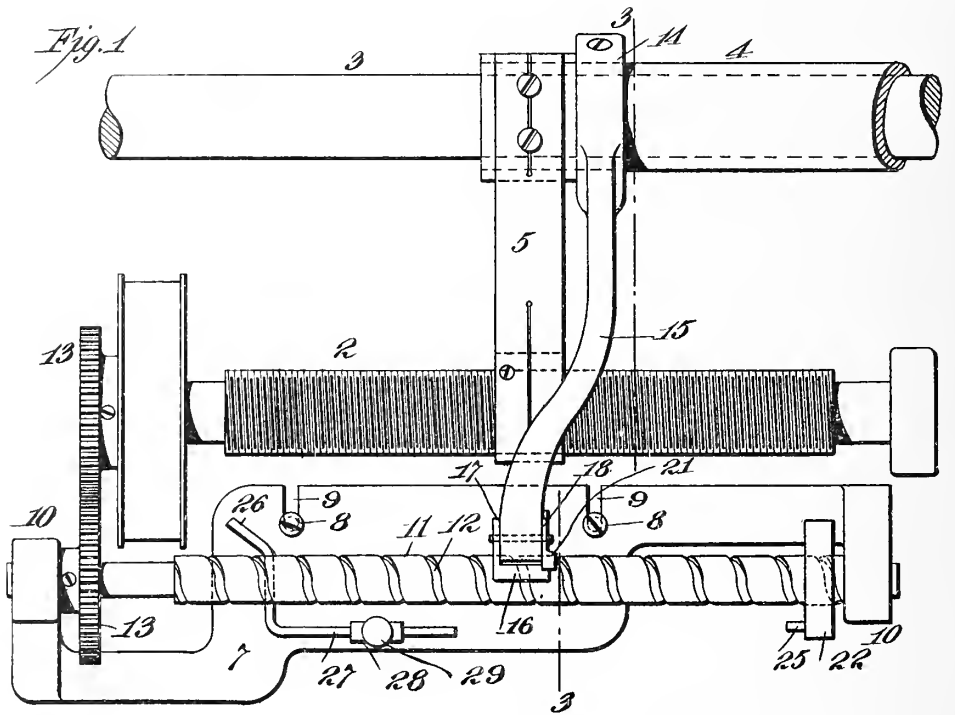
GEORGE W. GOMBER.

Witnesses:

W. H. JENNISH,
C. W. ROBBINS.



E. L. AIKEN.
REPEATING ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED JUNE 10, 1904.



Witnesses:

Delos Holden
Wm. C. MacArthur

Inventor

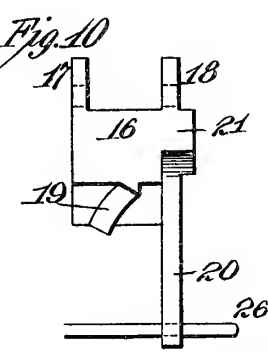
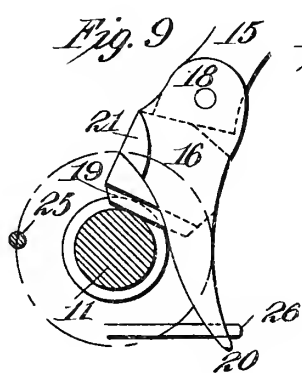
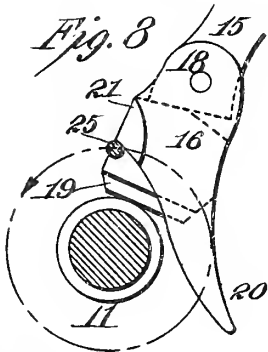
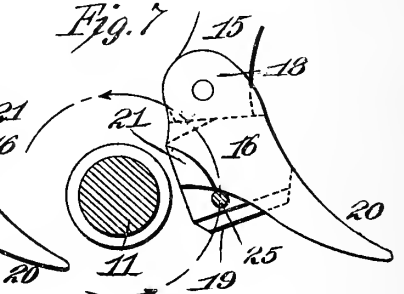
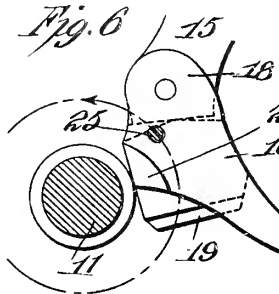
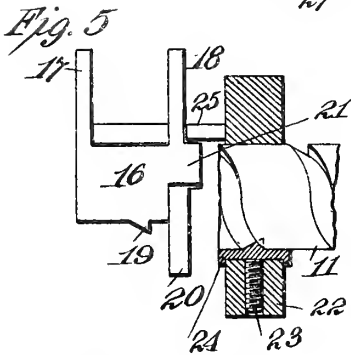
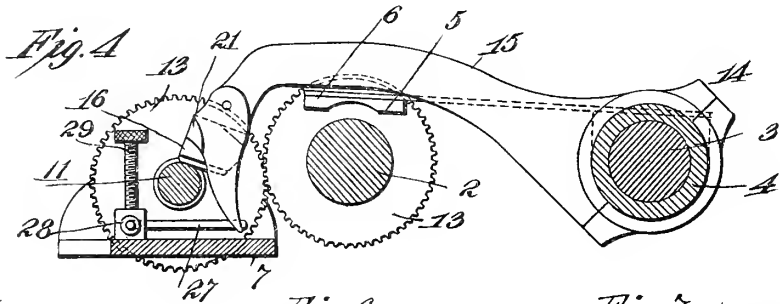
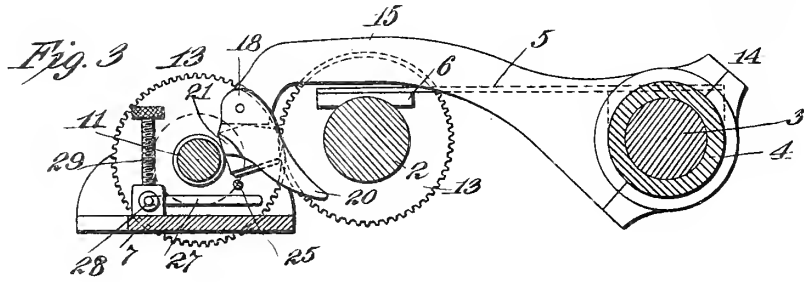
Edward L. Aiken
by *Frank L. Aiken*
Attorney.



E. L. AIKEN.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED JUNE 10, 1904.

2 SHEETS—SHEET 2.



Witnesses:

Delos Stoddard.
Maria C. Mae Arthur

Inventor

Edward L. Aiken
by *Frank T. Aiken*
Attorney

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

No. 798,087.

Specification of Letters Patent.

Patented Aug. 29, 1905.

Application filed June 10, 1904. Serial No. 211,917.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, residing at 643 Springdale avenue, East Orange, in the county of Essex and State of New Jersey, have invented a certain Repeating Attachment for Phonographs, of which the following is a description.

My invention relates to improvements in repeating attachments for phonographs or other talking-machines, adapted either for the purpose of repeating a selection indefinitely or for use in combination with any appropriate form of coin-operated mechanism for controlling the motor, whereby when the selection has been once reproduced by the prepayment of a coin the reproducer will be returned to the starting position to permit successive reproductions.

The object of my invention is to provide a device for the purpose which shall be effective and positive in its operation, of but few parts, capable of being readily attached to standard types of phonographs and other talking-machines, and which when applied will not in any way affect the operation of the device or prevent the reproducer from being fully raised to permit the records to be changed or the reproducer to be repaired or removed. At the same time the device provides for simple and effective adjustment whereby the reproducer may be caused to engage or be disengaged from the record immediately before and after the selection has been reproduced.

My invention has more particularly for its object the provision of means whereby the members which coöperate to raise the reproducer or diaphragm-carrier may obtain a broad bearing or contact surface for the lifting operation.

In the accompanying drawings, Figure 1 is a plan view showing a part of the main shaft, feed-screw, part of the back rod, sleeve, spring-arm, and feed-nut of a phonograph with my present improvements applied thereto; Fig. 2, a front view of the same; Fig. 3, a sectional view on the line 3-3 of Fig. 1, showing the repeating mechanism out of operation, as when the reproducer is in engagement with the record; Fig. 4, a corresponding view showing the repeating mechanism in operation. Figs. 5, 6, 7, 8, 9, and 10 are detail views of the lifting and return mechanism.

In all of the above views corresponding parts are represented by the same numerals of reference.

The phonograph is provided with the usual bed-plate 1, on which is mounted in suitable bearings (not shown) the main shaft 2, which carries the usual mandrel and which for a part of its length is cut with a fine screw-thread to feed the reproducer lengthwise of the record. The usual stationary back rod 3 is shown, on which is mounted the usual sleeve 4, arranged to slide on said rod and carrying the reproducing devices. (Not shown.) Secured to the sleeve 4 are the usual diaphragm-carrying arm 4^a and spring-arm 5, carrying the nut or nuts 6, engaging the threaded portion of the main shaft 2, all as is common in this art. The sleeve 4, together with the arm 4^a, may be termed the "diaphragm-carrier."

In applying my improved repeating attachment to a phonograph I make use of a small compact base 7, which by means of screws 8, engaging slots 9, is removably and adjustably secured to the bed-plate 1. The base 7 is provided with two bearings 10 10, in which is mounted a return-shaft 11, having a coarse-pitch return-screw 12. The return-shaft 11 is driven from the main shaft 2 by any approved gearing; but I preferably use two spur-gears 13 13, mounted on the two shafts, respectively, engaging together, as shown. Secured to the sleeve 4 by a split collar 14 is an arm 15, having a bend at its center, so that it projects over in front of and substantially in line with the spring-arm 5. Pivoted at the downwardly-projecting free end of the arm 15 is a lifting and return dog, the special form, proportions, construction, and operation of which are shown in Figs. 3 to 10, exclusive. This lifting-dog comprises a block 16, having two ears 17 and 18 at the sides, by means of which the dog is pivoted to the arm 15. The upper face of the block 16 is formed on two angles, (see Figs. 3, 4, 6, 7, 8, and 9,) whereby the dog will be capable of moving between the extreme positions, which are determined by the engagement of one or the other of the angular faces with the bottom end face of the arm 15. One of these extreme positions is shown in Fig. 4, the other extreme position being somewhat beyond the normal position of the parts shown in Fig. 3. The under side of the block 16 is formed with

a rib 19 of the proper size and at the correct angle to engage the thread of the return-shaft 12. The ear 18 is provided with a downwardly and rearwardly extending tail 20, by means of which the dog will be disengaged from the return-screw, as will be explained. Extending out from the side of the tail 20, at its upper portion, is a small lug or projection 21, whose under face partakes of the same curve as the tail 20, as shown. Mounted on the return-screw 12 is a disk 22, having a screw 23, whose inner end bears upon a small key 24, engaging the thread of the return-screw, so that by rotating the disk it may be adjusted longitudinally of the return-screw, and by tightening the screw 23 the disk may be securely locked in any position of its longitudinal adjustment.

In order to elevate the arm 15 and swing the dog to engage it with the return-screw when the record has been reproduced, I provide the disk 22 with a pin or projection 25, which normally—*i. e.*, when the parts are in the position shown in Fig. 3—travels in a path encircling the path of the lug 21. To illustrate this, I show in Fig. 3 the pin 25 and in dotted lines the path which it transcribes relatively to the lug 21. In order to trip the dog and determine the position at which the reproducer shall again engage the record, I provide an inclined arm 26, arranged in the path of the tail 20, and said arm is formed integrally with a rod 27, passing through a sleeve 28, secured to the base 7 and engaged by a set-screw 29, so that the position of the curved arm or cam 26 may be adjusted.

When the reproducer is in engagement with the record and the instrument started, the feed-nut 6 will be in engagement with the threaded portion of the main shaft 2, and the lifting-dog by its weight will hang in the position shown in Fig. 3 immediately behind the return-screw 12, but out of engagement therewith. Consequently the phonograph will operate in the usual way to effect the reproduction, the return-shaft being rotated continuously. As the reproducer approaches the end of the record the lug 21 will in being slowly moved toward the disk 22 be gradually overlapped by the pin 25, which for a number of revolutions will encircle said lug. (See Figs. 3 and 6.) When, however, the pin 25 engages the tail 20, the dog will be moved rearwardly to its limit, (see Fig. 7,) whereupon the upward movement of the pin 25 will lift the arm 15, so as to elevate the nut 6 from the feed-screw and the reproducer from the record. This feature is of great importance, for the reason that the forward feed of a phonograph-carriage as commercially constructed—*i. e.*, the pitch of the feed-screw—is only one one-hundredth of an inch. Consequently the first contact of the rotating member and traveling member cannot be more than one

one-hundredth of an inch in width and may be anything less. Under ordinary conditions this width of contact is not sufficient to accomplish the lifting in a reliable manner, because as soon as the feed-nut is lifted from the feed-screw the carriage frequently slides back, so that the lifting members are separated and the carriage falls, and this difficulty becomes much worse as soon as the parts become even slightly worn. An exceedingly narrow bearing-surface will, however, be sufficient to swing the dog on its pivot, because there is practically no resistance to such motion. The change of position of the dog throws a wide bearing-surface into the path of the rotating projection just before the lifting operation and renders it impossible for the carriage to fall. By reason of the circular path transcribed by the pin 25 the latter not only elevates the arm 15, but before leaving the lug 21 swings the dog forwardly (see Fig. 8) until the rib 19 is brought above the return-screw, so as to be engaged by the thread of the screw immediately after the pin leaves the lug 21. By reason of the rotation of the return-screw 12 the dog will be maintained in the position shown in Fig. 4 with the rib 19 in engagement with said screw. In this position the return-screw moves the parts rearwardly at a rapid rate, owing to the coarseness of the pitch of the return-screw, until the tail 20 of the dog engages the cam 26, whereupon the dog will be swung rearwardly, disengaging the rib 19 from the return-screw and permitting the feed-nut 6 and reproducer to again engage the feed-screw and record, respectively. By longitudinally adjusting the disk 22 on the return-screw in the manner explained the pin 25 will always bear a definite relation to the thread of the screw, so that immediately after the pin leaves the lug 21 the rib 19 will be engaged by the thread of the screw. In this way the return movement of the screw will move the dog sufficiently away from the disk 22 by the time the pin 25 once again approaches the tail 20 as to clear the parts, so that the pin 25 will not strike the said tail. If, on the other hand, this adjustment was not effected, there would be the danger of the rib not being engaged by the thread of the return-screw soon enough to start the return movement before the pin 25 again engaged the tail 20.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In a repeating attachment for talking-machines, the sound-box and means for supporting and progressively moving the same when in its operative position, in combination with a return feed-screw and means for elevating the sound-box, comprising a rotating member, and a member traveling with the sound-

box toward said rotating member and provided with a contact-surface of progressively-increasing width, substantially as set forth.

2. In a repeating attachment for talking-machines, the sound-box and means for supporting and progressively moving the same when in its operative position, in combination with a return feed-screw and means for elevating the sound-box comprising a projection rotating in a plane and a projection extending in the direction of said progressive movement and traveling with the sound-box toward said plane, said projections normally moving in paths which do not intersect, whereby said projections are permitted to overlap, one of said projections being so pivoted that when moved on its pivot, its new path intersects the path of the other projection, substantially as set forth.

3. In a repeating attachment for talking-machines, the combination with the diaphragm, carrier, feed-nut, feed-screw and return-screw of a dog secured to said carrier by a pivot parallel to said return-screw and provided with a contact-surface of increasing width and means which engages said dog and oscillates it, and which then engages the wider portion of said dog presenting a substantially greater overlap and raises the sound-box carrier, substantially as set forth.

4. In a repeating attachment for talking-machines, the combination with the diaphragm-carrier, feed-nut, feed-screw and return-screw, of an arm secured to the carrier, a dog pivoted to said arm, a lug carried by said dog and means rotating with the feed-screw for successively engaging said dog, and lug, substantially as set forth.

5. In a repeating attachment for talking-machines, the combination with the diaphragm-carrier, feed-nut, feed-screw and return-screw, of an arm secured to the carrier, a dog pivoted to said arm, a disk carried by the return-screw and adjustable in line with the thread

thereof, and a projection on said disk cooperating with said dog to raise the carrier, substantially as set forth.

6. In a repeating attachment for talking-machines, the sound-box and means for progressively moving the same when in its operative position, in combination with a return feed-screw and means for elevating the sound-box, comprising a rotating member and a member traveling with the sound-box toward said rotating member, said traveling member being provided with a contact-surface having one portion so placed that it overlaps the rotating member during more than one revolution thereof, whereby a substantial bearing-surface is obtained for the lifting operation, and having another portion so placed as to intersect the path of said rotating member and thereby initiate the lifting operation, substantially as set forth.

7. In a repeating attachment for talking-machines, the sound-box and means for supporting and progressively moving the same when in its operative position, in combination with a return feed-screw and means for elevating the sound-box, comprising a rotating member, and a member traveling with the sound-box toward said rotating member, one of said members being provided with a contact-surface having one portion so placed that it overlaps the other member during more than one revolution of the rotating member, whereby a substantial bearing-surface is obtained for the lifting operation, and having another portion so placed as to intersect the path of the other member, and thereby initiate the lifting operation, substantially as set forth.

This specification signed and witnessed this 9th day of June, 1904.

EDWARD L. AIKEN.

Witnesses:

FRANK L. DYER,
MINA C. MACARTHUR.



F. A. MILETTE.
ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED NOV. 22, 1904.

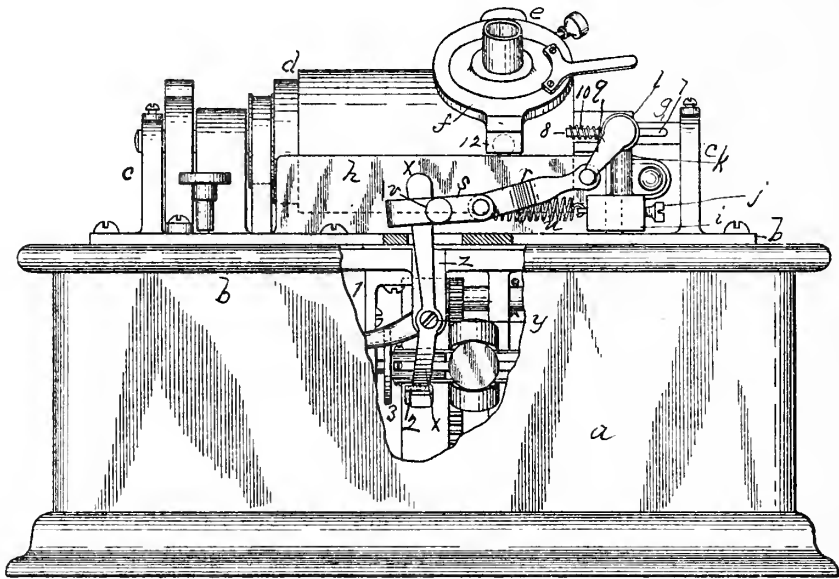


Fig. 1.

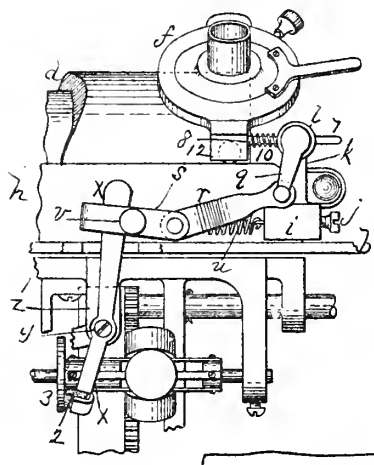


Fig. 2.

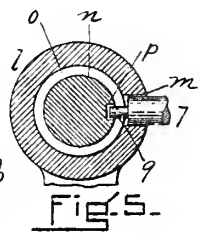


Fig. 5.

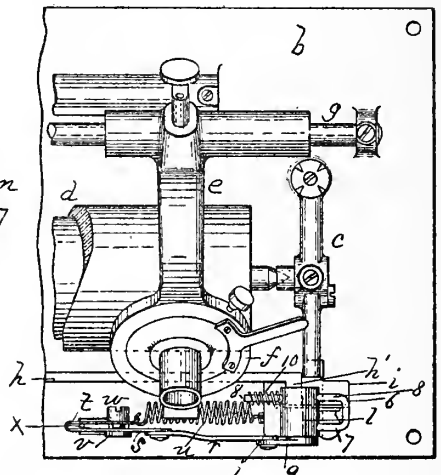


Fig. 3.

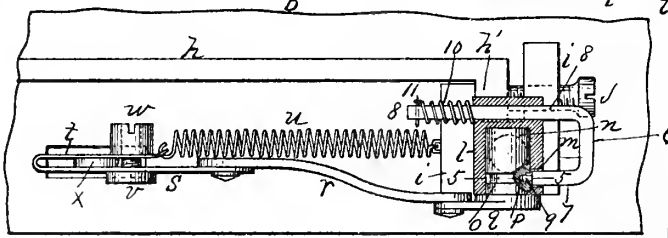


Fig. 4.

WITNESSES.
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C. L. Baker.

INVENTOR
Felix A. Millette,
By his Atty
Sherry Williams.

UNITED STATES PATENT OFFICE.

FELIX A. MILETTE, OF LACONIA, NEW HAMPSHIRE, ASSIGNOR OF ONE-HALF TO GEORGE A. COLLINS, OF LACONIA, NEW HAMPSHIRE.

ATTACHMENT FOR PHONOGRAPHS.

No. 798,816.

Specification of Letters Patent.

Patented Sept. 5, 1905.

Application filed November 22, 1904. Serial No. 233,876.

To all whom it may concern:

Be it known that I, FELIX A. MILETTE, a citizen of the United States, residing in Laconia, in the county of Belknap and State of New Hampshire, have invented a new and Improved Attachment for Phonographs, of which the following is a specification.

This is a device or attachment adapted to be applied to phonographs or similar machines for producing sound.

The invention has for its object to provide an attachment whereby the operating mechanism of the phonograph will be stopped when the reproducer reaches the end of the record, or, in other words, at the end of the tune, speech, or piece reproduced by the phonograph.

Much annoyance has been experienced, especially in establishments where many phonographs are exhibited, by reason of the fact that the phonograph may reach the end of the tune or speech when the attendant is at a distance, and hence cannot stop it, especially as the sounds produced at the end of the tune or speech are exceedingly unpleasant. By means of my attachment the phonograph will stop automatically at the end of the tune without requiring to be touched by any one.

The nature of the invention is fully described below and illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a phonograph with my attachment applied thereto, portions of the front wall and top of the case and of the base-plate being broken out. Fig. 2 is a front elevation of a sufficient portion of the mechanism to illustrate my invention in position, the case having been removed and a portion of the base-plate being broken out. Fig. 3 is a plan view of a portion of a phonograph with my invention applied thereto. Fig. 4 is an enlarged plan and horizontal section in detail of my invention in position on the base-plate, portions being shown of some of the adjacent parts of the phonograph. Fig. 5 is an enlarged vertical section taken on line 5 5, Fig. 4. In Figs. 1, 3, 4, and 5 the parts are in the position assumed when the brake is off and the phonograph is in operation. In Fig. 2 the parts are in the position assumed when the brake is set against the

brake-wheel and the operating mechanism of the phonograph stopped.

Similar characters of reference indicate corresponding parts.

a represents the box or case containing the actuating mechanism of a phonograph, said mechanism being constructed substantially as usual. *b* is the ordinary base-plate supported by the case and supporting, by means of a suitable frame *c*, the record-cylinder *d*. *e* represents the arm supporting the reproducer *f* and traveling on the rod *g*, said reproducer resting on the track *h*. All these parts are constructed and operate as usual.

A base or block *i* is secured by a set-screw *j* or other suitable means to the forwardly-extending vertical end *h'* of the track *h*, and said base supports a vertical post or standard *k*, which has integral with it or mounted on its upper end the hollow head or circular box *l*, provided on its outer side with the horizontal hole *m*, Figs. 4 and 5. Supported by and having its bearings in said box is a stud *n*, provided with the annular groove *o* and within this groove with a substantially radial notch or recess *p*. Rigid on or integral with this stud is the downwardly-extending arm *q*, pivotally connected at its outer end with one end of a link *r*, the opposite end of said link being pivotally connected to a clamp consisting of two members *s* and *t*, the member *s* being directly connected with the link *r* and the member *t* being connected by a spring *u* with the base or block *i*. Clamped between the two members *s* and *t* by means of the bolt *v* and nut *w*, said bolt extending through the members, is the upper end of the brake-lever *x*. This brake-lever is pivoted at *y* to a bracket or hanger *z*, extending down from a stationary portion of the frame 1 of the machine. The brake-lever is provided with the ordinary brake-shoe 2, which when it is pressed against the disk or brake-wheel 3 stops the actuating mechanism in the ordinary and well-known manner. It will be understood that the brake-lever *x*, brake-shoe 2, and brake-wheel 3 are not novel in this invention. 6 represents a horizontally-disposed U-shaped rod provided with the parallel arms or members 7 and 8 of unequal length. The member 7 extends into the hole *m* in the box *l* and is provided at its

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end with a horizontal locking-pin 9, adapted to enter the notch p . The member 8 extends through a horizontal hole in the solid portion of the box, and a spiral spring 10 is disposed around said member between the box and the pin 11.

The common practice at present is to start the machine by swinging the upper end of the brake-lever x toward the left by hand, thus releasing the brake-wheel, as in Fig. 1, and when the reproducer reaches the right-hand end of the record on the cylinder and the operator begins to hear the unpleasant sounds which are produced by the machine at the end of a tune he grasps the brake-lever and swings its upper end toward the right, stopping the machine. Of course if he is at a distance from the phonograph, or engaged, the sounds continue until the reproducer reaches the end of the cylinder. By means of my attachment the brake-lever is locked in an open position—that is, out of engagement with the wheel 3—while the tune is being played and is released automatically and set against the wheel 3 as soon as the tune is finished.

In practical operation when the brake-lever is in the position indicated in Fig. 1—that is, swung toward the left with the brake-wheel free to rotate—the locking-pin 9 lies in the notch p , as indicated in Figs. 4 and 5, and the brake-lever is thus locked out of engagement with the brake-wheel. The reproducer having been drawn toward the left end of the cylinder, as it moves toward the right it continues to travel until it reaches the right edge or end of the record on the cylinder, when the projection 12 strikes the end of the member 8 of the bent rod 6, pushes it against the power of the spring 10, and withdraws the pin 9 on the end of the member 7 from the notch p . This releases the stud u and allows the spring u to pull the clamp s toward the right, with the effect that the brake-lever x is set against the brake-wheel by the power of the spring u , as indicated in Fig. 2, while the link r swings the outer end of the arm q toward the right and rotates the notched portion p of the stud u upward away from the pin 9. (See Fig. 2.) Thus the tune is stopped as soon as the reproducer reaches the right end or edge of the record, that being the moment when the member 8 of the bent rod 6 is struck. To release the brake-lever for the purpose of allowing the machine to repeat the tune, it is swung toward the left by the operator pulling the lower end of the arm q in the same direction and rotating the stud u until its notch p is opposite the locking-pin 9, when said pin is drawn into the notch by the spring 10 and

the brake thus locked in an open position, the parts being in the position illustrated in Figs. 1, 3, 4, and 5.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The herein-described improved attachment for phonographs and analogous machines, comprising a stud or shaft and means for supporting the same; a locking-rod normally in engagement with and locking said stud, said rod being in the path of the reproducer; mechanism rigidly secured to the brake-lever; and mechanism intermediate of the brake-lever and the stud, whereby the disengagement of the locking-rod from the stud causes the brake-lever to swing and set the brake, stopping the machine, substantially as and for the purpose set forth.

2. The herein-described improved attachment for phonographs and analogous machines, comprising the stud u provided with the notch p ; a supporting-post in which said stud has its bearings; the bent rod 6, 7, 8, the member 8 thereof extending into the path of the reproducer, and the member 7 extending normally into the notch on said stud; mechanism connecting the stud and the brake-lever; and a spring intermediate of the brake-lever and the stationary support for the stud, whereby as the bent rod yields to the reproducer, the stud is unlocked and rotated and the lever is swung toward the stud, thus setting the brake, substantially as and for the purpose set forth.

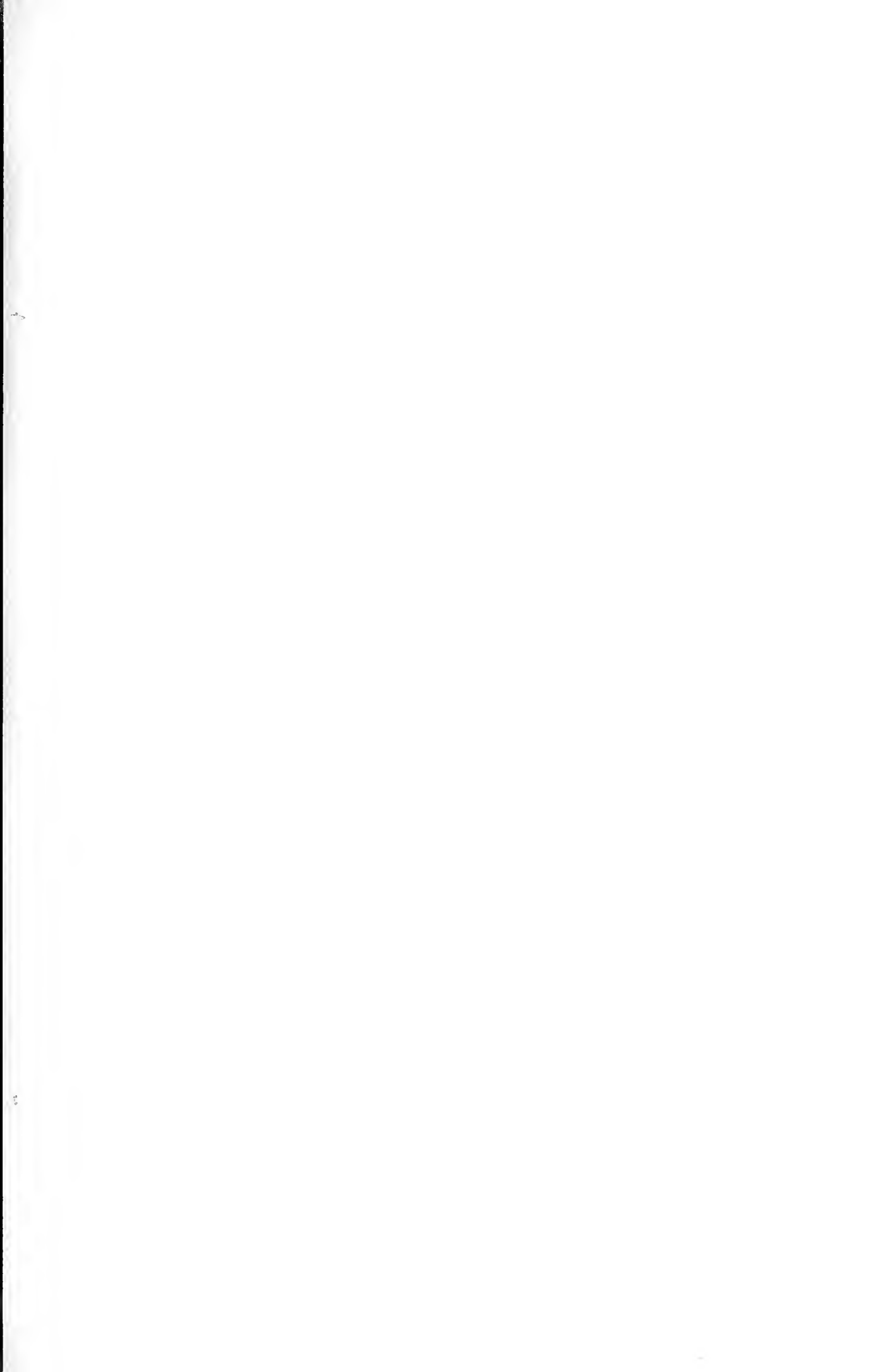
3. The herein-described improved attachment for phonographs and analogous machines, comprising the standard k ; the hollow head or box l provided with the hole m ; the stud u in said box, said stud being formed with the annular groove o and the notch p in said groove; the arm q rigid with said stud; a clamp adapted to be secured to the upper end of the brake-lever; mechanism connecting said arm and clamp; a spring connecting the clamp with the standard; and the U-shaped rod 6 provided with the arms or member 7 and 8, the member 7 being provided with a pin 9 which is held normally in engagement with the notch on the stud by a suitable spring, and the member 8 being supported and located in the path of the reproducer, for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FELIX A. MILETTE.

Witnesses:

EARL L. SARGENT,
GEORGE H. SMITH.



No. 798,830.

PATENTED SEPT. 5, 1905.

L. T. PRUDON.
ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED MAR. 27, 1905.

FIG. 1.

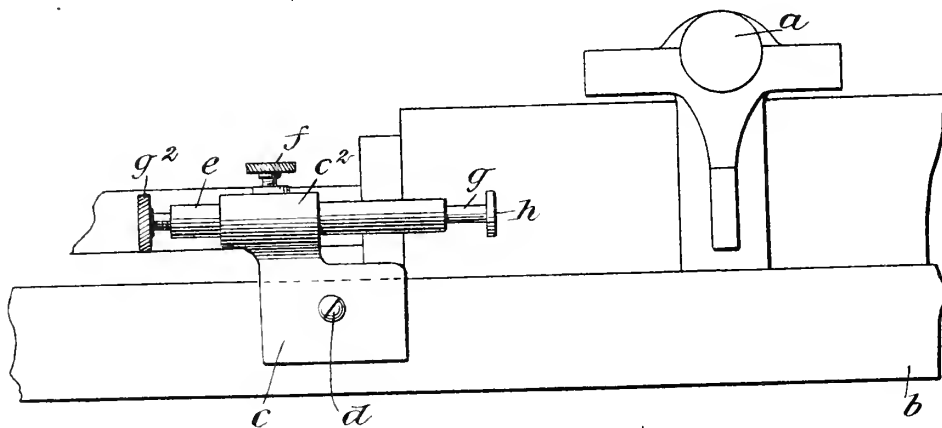


FIG. 2.

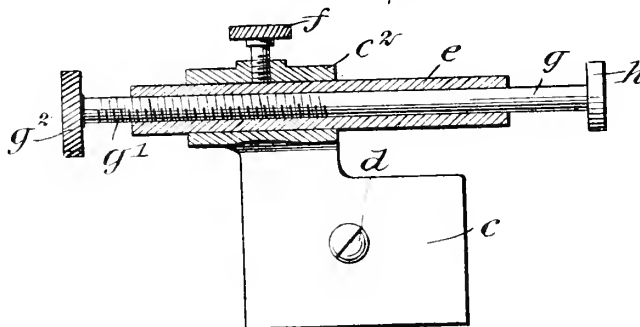
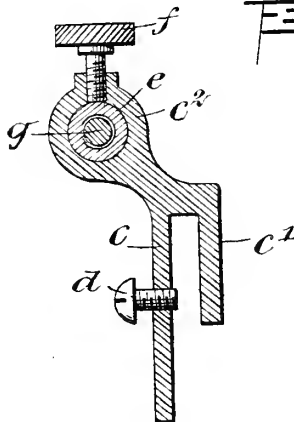


FIG. 3.



WITNESSES:

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INVENTOR

Louis T. Prudon

BY

Wm. M. ...
ATTORNEYS

UNITED STATES PATENT OFFICE.

LOUIS T. PRUDON, OF NORTH BERGEN, NEW JERSEY.

ATTACHMENT FOR PHONOGRAPHS.

No. 798,830.

Specification of Letters Patent.

Patented Sept. 5, 1905.

Application filed March 27, 1905. Serial No. 252,188.

To all whom it may concern:

Be it known that I, LOUIS T. PRUDON, a citizen of the United States, and a resident of North Bergen, in the county of Hudson and State of New Jersey, have invented a new and Improved Attachment for Phonographs, of which the following is a full, clear, and exact description.

My invention relates to an attachment for phonographs and similar instruments, said attachment being in the nature of a gage for stopping the carriage of a phonograph at any desired point in order to make repetitions of a record without repeating portions of the record which precede the part that it is desired to repeat.

The invention comprises a convenient attachment for this purpose, means for adjusting it roughly, and means for giving it a fine adjustment after the rough adjustment is made.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a diagrammatic view of a phonograph, showing a preferred form of my invention applied thereto. Fig. 2 is a sectional view of the attachment through the center of the adjusting-rod, and Fig. 3 is a transverse section of the same.

The device may be applied to any kind of a phonograph or graphophone, and consequently I have conventionally illustrated one having a carriage *a* and a stationary rail *b*. Upon this rail may be mounted at any point a bracket *c*, designed to be fixed to the rail by a screw *d*. The bracket is provided with a flange *c'*, designed to project over the rear of the rail in order to furnish a guide and assist in holding it in fixed position. The bracket is provided with a hub *c²*, having a longitudinal passage for receiving a sleeve *e*. This sleeve is designed to be placed longitudinally with respect to the rail and to be secured at any desired point in the hub by means of a screw *f*. This affords a rough adjustment for the device.

The inside of the sleeve is screw-threaded, either throughout its length or merely at one end, and receives a rod *g*, provided with screw-threads *g'* for engaging the screw-threads on the interior of the sleeve. The rod passes through the sleeve longitudinally and is pro-

vided with a stop *h* on one end and with a thumb-nut *g²* upon the other. It will be clear that the turning of the nut *g²* will result in a minute adjustment of the rod with respect to the sleeve and that consequently the rod is capable of two adjustments on the bracket *c*, which itself can be adjusted to any desired position upon the rail.

The operation of the device is as follows: As the carriage moves along with respect to the rail from the left to right the bracket is moved up to any convenient point and fixed to the rail by means of the screw *d*. The sleeve *e* and rod *g* are preferably located at this time in their extreme left-hand position. Then as the carriage continues to move the sleeve *e* can be moved along with it and adjusted to any convenient position which the operator considers as being near to the point at which the portion of the record to be reproduced will commence. Then the nut *g²* is manipulated to keep the stop *h* in contact with a portion of the carriage, and as soon as the desired part of the record commences to reproduce this fine adjustment is stopped. After the record is completed the carriage is returned until it strikes the stop *h*, and then the machine can be started with the certainty that the record desired will be reproduced.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with a phonograph having a movable carriage and a stationary rail, of a stop adapted to be placed in the path of the carriage, and means for mounting the stop upon the rail said means comprising a bracket adapted to be secured to the rail in any desired position.

2. An attachment for phonographs, comprising a bracket adapted to be adjustably mounted in stationary position upon the frame of the machine, and a stop movably mounted upon the bracket.

3. An attachment for phonographs, comprising a bracket adapted to be mounted in stationary position upon the frame of the machine, a stop movably mounted upon the bracket, and two independent means for adjusting the position of the stop with respect to the bracket.

4. An attachment for phonographs, comprising a bracket adapted to be secured to a machine, said bracket having a hub, a sleeve mounted in said hub, a rod passing through

said sleeve and provided with a stop, and means for adjusting the position of said stop with respect to the bracket.

5 An attachment for phonographs, comprising a bracket, means for securing the bracket at any desired position along the length of the phonograph, said bracket being provided with a hub having a passage longitudinally placed with respect to the direction of travel of the carriage of the phonograph, a sleeve mounted in said passage, a screw for securing said sleeve in any desired position with respect to the hub, a rod passing through said sleeve, said rod and sleeve
10 being provided with screw-threads for afford-

ing an adjustment to the rod, and a stop on the rod located in the path of travel of the carriage.

6. A phonograph attachment comprising a stop located in the path of the carriage of the phonograph, and having three devices for adjusting it in one direction. 20

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS T. PRUDON.

Witnesses:

THOMAS WHITE,
HENRY PRUDON.



No. 798,876.

PATENTED SEPT. 5, 1905.

J. H. B. CONGER & C. J. EICHHORN.

MEANS FOR CONNECTING AMPLIFYING HORNS TO TALKING MACHINES.

APPLICATION FILED SEPT. 1, 1903.

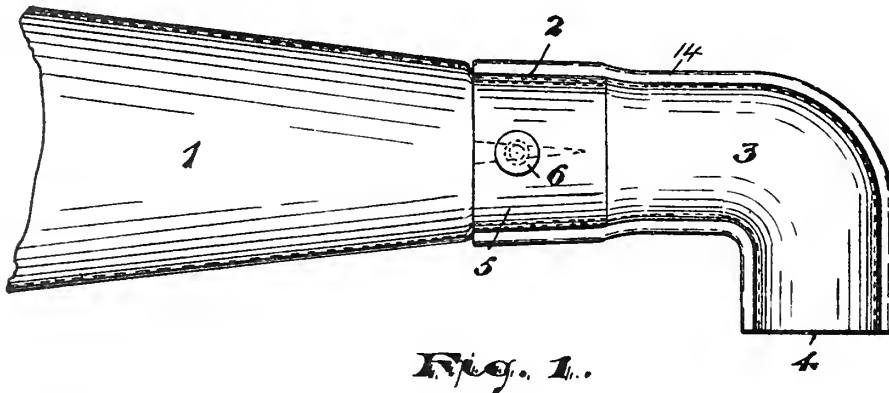


Fig. 1.

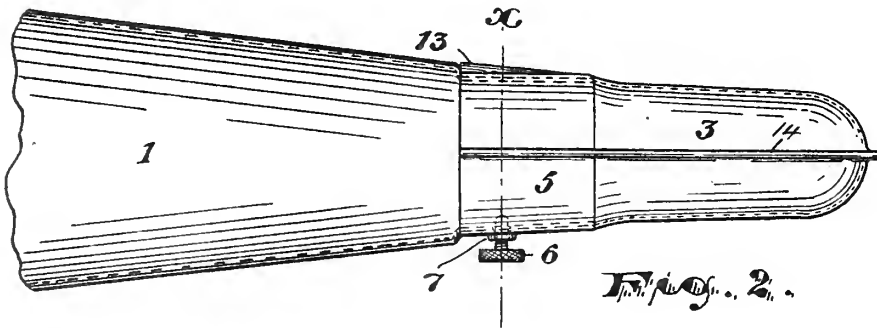


Fig. 2.

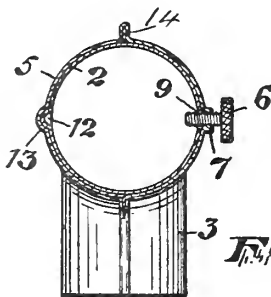


Fig. 3.

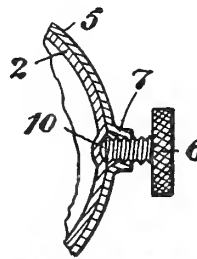


Fig. 4.

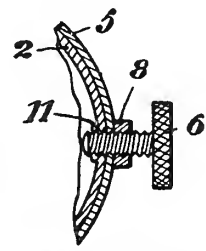


Fig. 5.

WITNESSES:

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BY

Charles H. Bell

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN H. B. CONGER AND CHARLES J. EICHHORN, OF NEWARK, NEW JERSEY, ASSIGNORS TO THE TEA TRAY COMPANY OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MEANS FOR CONNECTING AMPLIFYING-HORNS TO TALKING-MACHINES.

No. 798,876.

Specification of Letters Patent.

Patented Sept. 5, 1905.

Application filed September 1, 1903. Serial No. 171,483.

To all whom it may concern:

Be it known that we, JOHN H. B. CONGER and CHARLES J. EICHHORN, citizens of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented and produced a new and original Improvement in Means for Connecting Amplifying-Horns to Talking-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

This invention relates more particularly to the attachment of amplifying-horns to the sound-boxes or speakers of talking-machines, although it obviously may be utilized in any other similar connections; and the objects of the invention are to secure a tight-fitting joint without looseness or rattling, to enable the same to be quickly and easily connected or disconnected, to obtain a simple and inexpensive construction, and to secure other advantages and results, some of which may be hereinafter referred to in connection with the description of the working parts.

The invention consists in the improved connection for phonograph-horns and the like and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the claim.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts in each of the several figures, Figure 1 is a side view of our improved device connected to a horn, and Fig. 2 is a plan of the same. Fig. 3 is a cross-section upon line *x*, Fig 2; and Figs. 4 and 5 are detail sectional views of modified constructions of the fastening means.

In said drawings, 1 indicates a phonograph or amplifying horn having its small end reduced and tapered, as at 2, and 3 is a connecting-piece of our improved construction. Said connecting-piece may be either elbow-shaped, as shown, or straight, as is common in the art, and is adapted at its one end, as 4, to be connected to the sound-box or speaker of a

talking-machine in any suitable and well-known manner. The opposite end 5 of the connecting-piece 3 is slightly flared and made of proper size to slide on the end 2 of the horn, although it will be understood that it is not practicable in manufacturing large quantities cheaply to make the fit so exact that it will not with continued use become or wear loose, so that in jostling or other movement to which it is liable the connection may become inadvertently disconnected. It is to secure a more perfect connection of the elbow-piece to the horn and one which will be permanently free from looseness or dislodgment for which our invention is particularly intended.

The connecting-piece 3 is made of two longitudinal sections, each forming a half of the tubular piece and having at its edges radial flanges to be interfolded with the corresponding flanges of the other section, as shown at 14 in Fig. 3, to connect the two sections and hold them together as a single piece. The flanges of the two sections when they are folded together form longitudinal ribs 14 14 upon the connecting-piece at diametrically opposite sides, and which ribs, it will be understood, greatly increase the rigidity or strength of the connecting-piece at those points, as will be referred to hereinafter.

In the interior walls of the connecting-piece 3, preferably about half-way between the ribs 14 14 and at the flared end 5, which is adapted to receive the horn, we provide a tapered groove 13, larger at its outer end, which lies at the end edges of the horn and gradually tapering or being reduced inwardly to a point. Upon the outer wall of the horn end 2 is formed a longitudinally-tapered rib or projection 12, which is larger at the inner portion of the horn end 2 or adjacent to the body of the horn and tapers toward the extremity of the horn, ending in a point. This rib is adapted to enter the groove 13 of the connecting-piece and with a wedging effect so as to take up any looseness between the horn end and mouth of the connecting-piece. To accomplish the same purpose as the rib 12 and groove 13, which have been described, we may employ the set-screw shown at the opposite side of the connection and illustrated more particularly in Fig. 4. Here a threaded

perforation is formed in the end 5 of the connecting-piece, through which works a set-screw 6, adapted at its inner end to abut against the wall of the extremity 2 of the horn. Preferably a socket or seat 10 is provided to receive the extremity of the set-screw, and obviously in either case by turning up said set-screw any looseness between the horn and connecting-piece will be taken up.

Preferably both the set-screw and the rib-and-groove construction are employed on the same connecting-piece, being located at diametrically opposite points, as shown, and halfway between the ribs 14 14. It will be understood, however, that either one may be employed alone, and where they are both employed the set-screw may project through the wall of the horn end, if desired, either loosely through a hole 9, as in Fig. 3, or screwing into a threaded perforation 11, as in Fig. 5. In this latter case, however, the set-screw serves only as a stop to prevent longitudinal separation of the end piece and horn, whereas the function of such a stop in addition to its primary function of wedging.

In use it will be noted that when a horn and connecting-piece are slid together the wall of the connecting-piece being thin and flexible to a considerable extent would yield to the shape of the horn end, except at the points where the two ribs 14 14 extend longitudinally. These two points will press rigidly against the horn end at opposite sides thereof, even though the walls of the connecting-piece intermediate of said ribs are loose or standing away from the outer surface of the horn end. Obviously, therefore, without means for taking up any such existing looseness the connection might be tight only at the diametrically opposite points where said ribs 14 lie, so that there could be more or less rocking or lost motion in a plane at right angles to the plane of said ribs. If, however, such means as the set-screw 6 or rib and groove 12 13 be employed at one side of the connection between the ribs, it will take up all looseness on that side, and, furthermore, act sufficiently on the diametrically opposite side to take up more or less completely the looseness there. We prefer, however, to use such take-up means on both sides of the connection, so as to secure the most rigid and firm connection possible. Furthermore, by using both such means, one a rib and groove and the other a set-screw, there is an element of coöperation between them in that the rib and groove serves to guide or aline the parts in connecting, so that the set-screw will properly enter its seat, and at the same time each

of them independently exercises its primary wedging function.

In order to secure suitable thickness of the walls of the perforation for the set-screw in the connecting-piece, a boss may be formed, either by pressing up the metal of the connecting-piece, as at 7, Fig. 4, or by applying an extra piece 8, as shown in Fig. 5.

While a connecting-piece, made of drawn tubing or all in one integral piece, might be employed without the take-up means described, it will be understood that the conditions are very different with a connecting-piece jointed longitudinally at diametrically opposite points, such as we use. Here there are formed opposite lines in the walls of the connecting-piece which are rigid or unyielding, while the intermediate parts of the walls of the connecting-piece are flexible to a considerable extent, and, as above stated, therefore when slid on the end of a horn these two diametrically opposite points engage unless, indeed, the connecting-piece is made with infinite precision, and therefore the rocking described is possible and must be prevented.

Having thus described the invention, what we claim as new is—

The combination of a tubular connecting-piece comprising two longitudinal sections joined at their edges by radial interfolded flanges which form exterior longitudinal ribs upon the connecting-piece, the said connecting-piece being adapted at one end to receive the end of a horn and having at one side intermediate of its said longitudinal ribs an interior tapered groove whose large end lies at the end edges of the connecting-piece and which tapers longitudinally inward, said end of the connecting-piece having in its walls opposite said groove a set-screw working in said perforation, and a horn having at its end adapted to enter the connecting-piece a seat to receive said set-screw and also having an exterior tapered rib whose large end lies next the body of the horn and which tapers outward toward the extremity of the horn, said tapered rib being adapted to enter the said tapered groove of the connecting-piece with a wedging effect and to also guide or center the said seat for the set-screw with respect to said set-screw.

In testimony that we claim the foregoing we have hereunto set our hands this 14th day of August, 1903.

JOHN H. B. CONGER.
CHARLES J. EICHHORN.

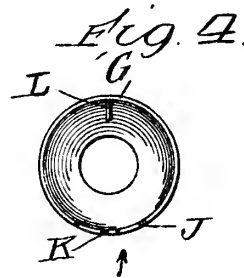
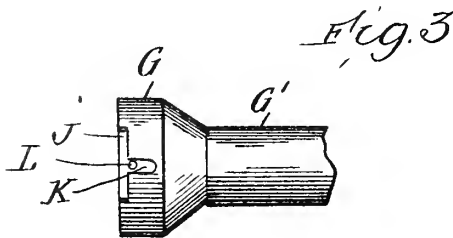
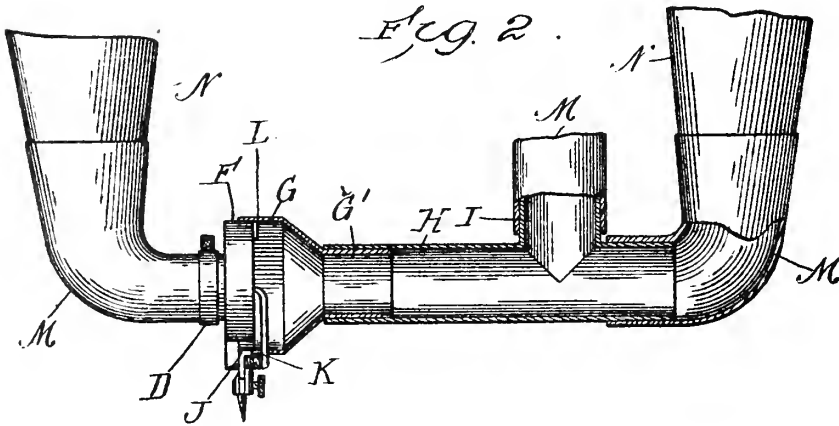
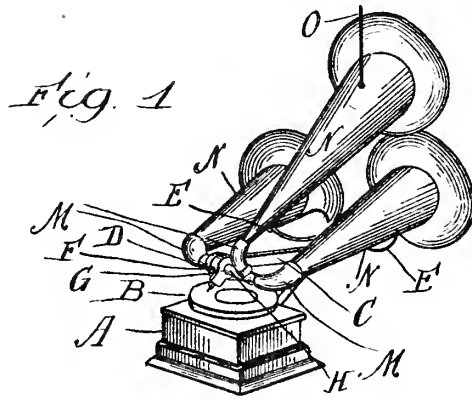
Witnesses:

RUSSELL M. EVERETT,
CHARLES H. PELL.



C. HILGENBERG.
GRAMOPHONE.

APPLICATION FILED DEC. 22, 1904.



Witnesses:
Harry P. White
Ray White.

Inventor:
Conrad Hilgenberg
 By *Morgan & Robinson Attys.*

UNITED STATES PATENT OFFICE.

CONRAD HILGENBERG, OF CHICAGO, ILLINOIS.

GRAMOPHONE.

No. 799,055.

Specification of Letters Patent.

Patented Sept. 12, 1905.

Application filed December 22, 1904. Serial No. 237,954.

To all whom it may concern:

Be it known that I, CONRAD HILGENBERG, a citizen of the United States, residing at 96 Twenty-fourth Place, in the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Gramophones, of which the following is a specification.

My improvement relates to that part of the gramophones described as the "reproducer" and the connections with that part and the horn.

The object of my invention is to provide a cheap and simple device by which one or more horns may be attached to the ordinary gramophone for the purpose of increasing the sound and improving the tone of the instrument. The manner in which I accomplish this object is described in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of the gramophone with my device attached. Fig. 2 is an enlarged view, partly in section, of my device attached to the gramophone. Fig. 3 is a detail view of a conical box forming part of my device. Fig. 4 is an inside plan view of the box shown in Fig. 3.

In the drawings, A indicates the ordinary gramophone-box, containing the operative mechanism supporting the disk B. This box also supports a bracket (not shown) carrying an arm C, having a ring D. In this ring the box F, containing the reproducing mechanism, is adjustably held. The arm C also supports adjustable arms E, which are adapted

to support the horns N. The conical box G is flanged to fit tightly on the periphery of the box F and is recessed at J and K to admit the projecting mechanism of the reproducer. The box G is extended at G' and is thereby adapted to support a tube H. The tube H is constructed with a part I at right angles to the length of the tube and adapted to support an elbow M. The end of the tube is also adapted to support another elbow. The two elbows thus supported and connected are adapted to each support a horn N.

The several parts herein described are adapted to be slipped together and disconnected easily and quickly, the stop-pin L limiting the adjustment of the box G on the box F and the adjustment of the arms E and suspension-wire O regulating the positions of the horns in relation to each other.

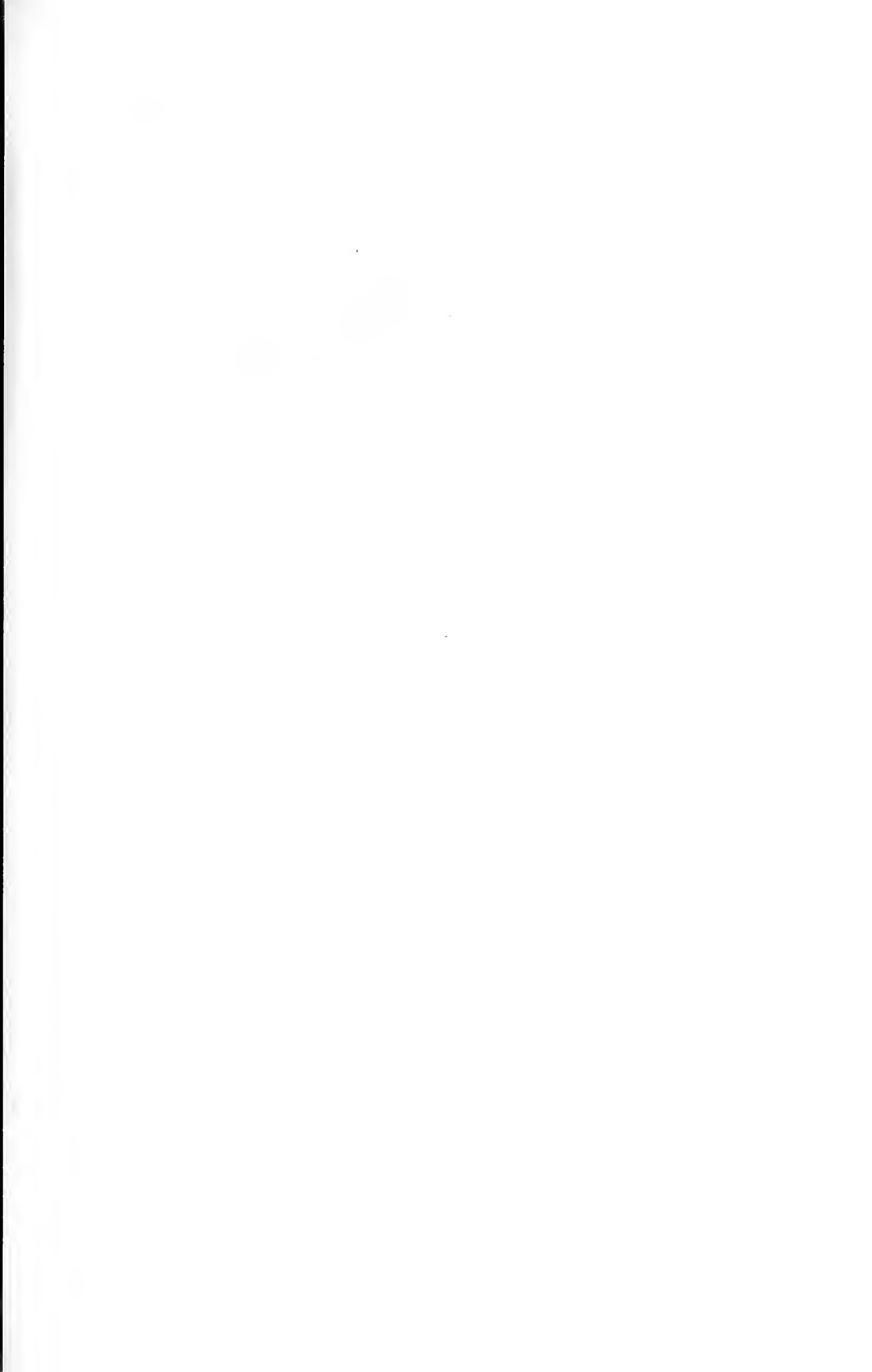
What I claim as new, and desire to secure by Letters Patent, is—

The combination with a gramophone of the kind described, of a device consisting of a conical box G having recesses J and K, a stop-pin L and extension G'; a tube H having a projection I, said tube being adapted to fit the extension G' of the box G; and elbows M adapted to fit the part I and the end of the tube H, and to support the horns N; and supporting-arms E and suspending-wire O, substantially as described and for the purposes specified.

CONRAD HILGENBERG.

Witnesses:

JULIUS RUBINSTEIN,
THOMAS J. MORGAN.

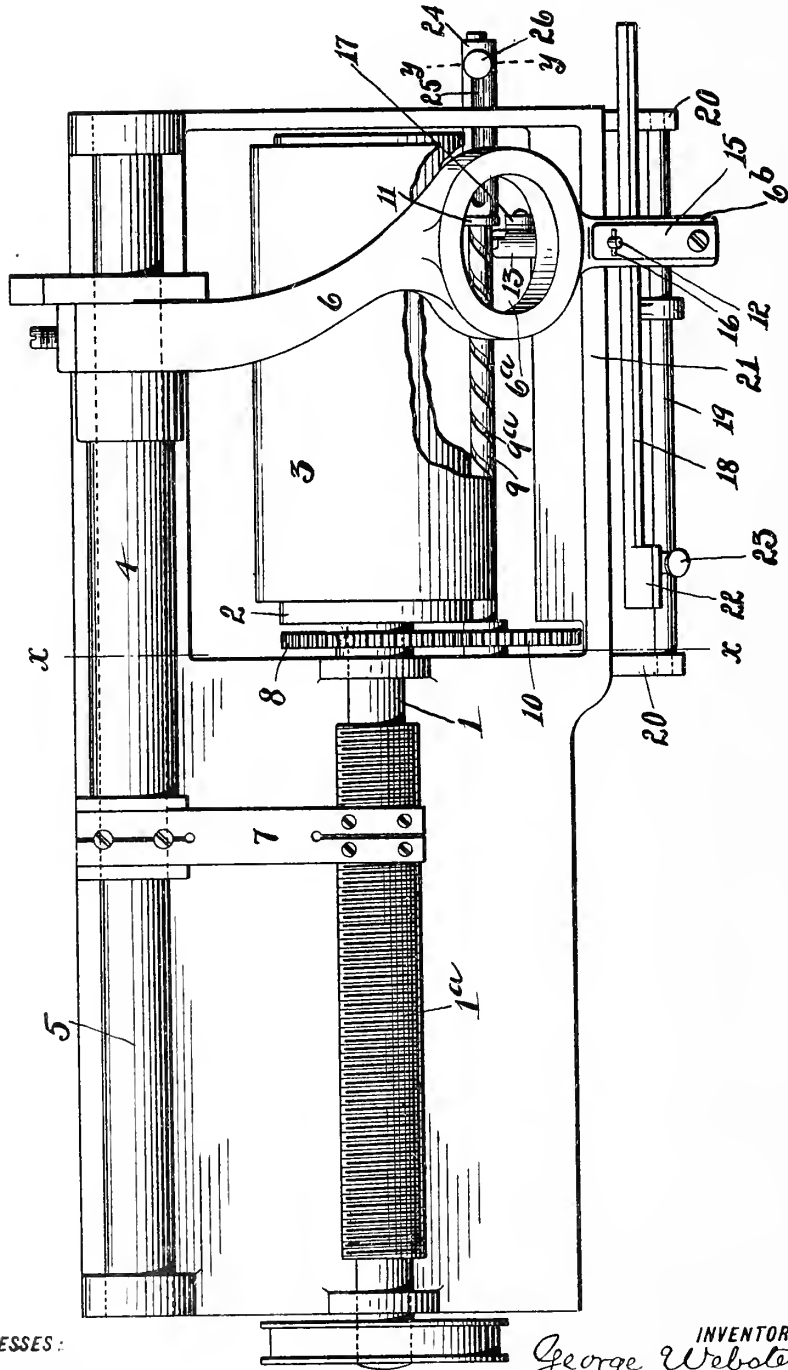


G. WEBSTER.
PHONOGRAPH.

APPLICATION FILED APR. 12, 1904.

2 SHEETS—SHEET 1.

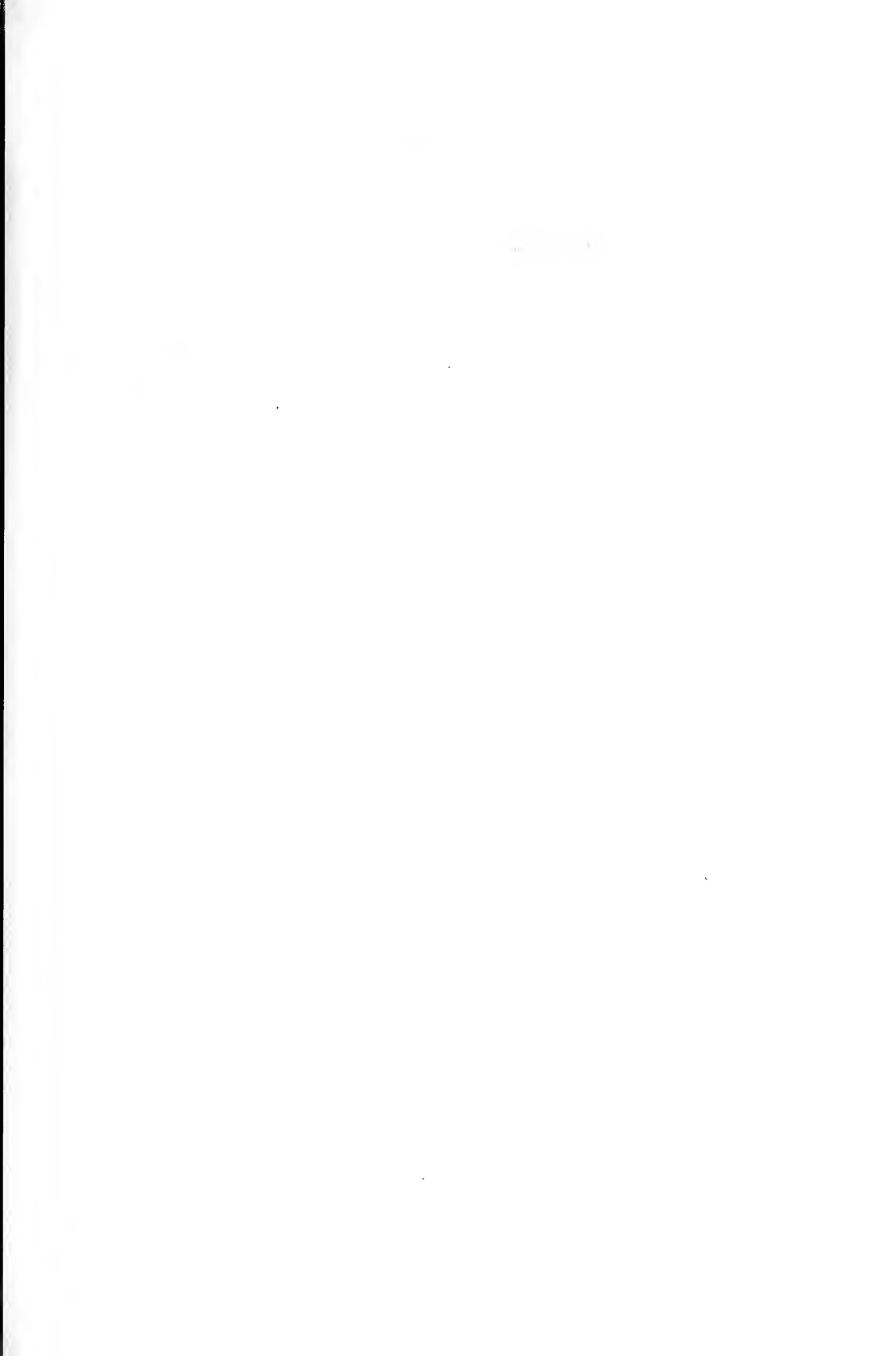
Fig. 1.



WITNESSES:

Walter C. Pusey
Chas. A. Feal

INVENTOR:
George Webster
BY
Joshua Pusey
ATTORNEY.



G. WEBSTER.
PHONOGRAPH.

APPLICATION FILED APR. 12, 1904.

2 SHEETS—SHEET 2.

Fig. 2.

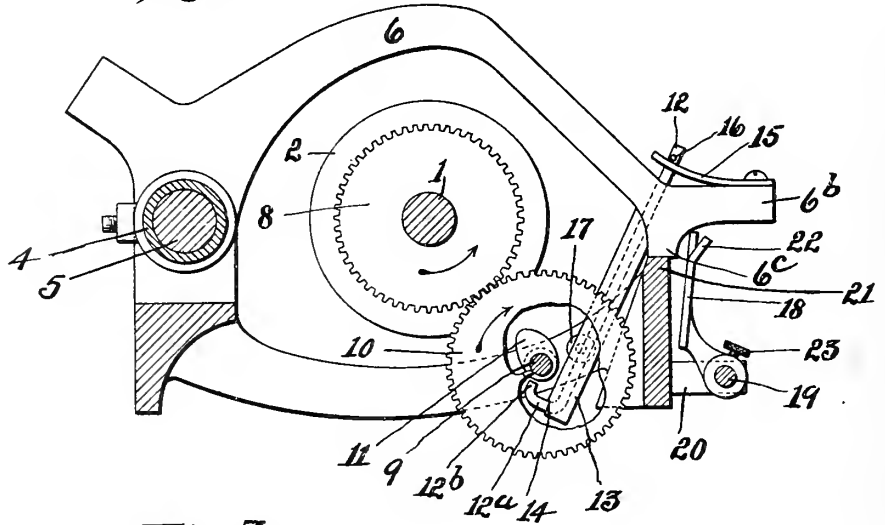


Fig. 3.

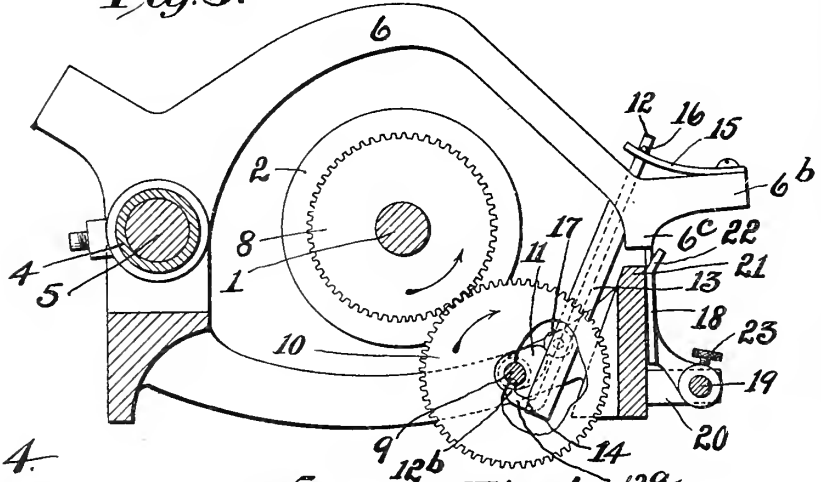


Fig. 4.

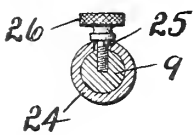


Fig. 5.

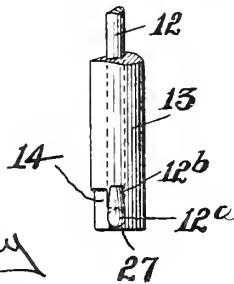
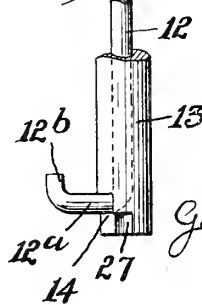


Fig. 6.



WITNESSES:

Walter C. Pusey
Chas. A. Teal

INVENTOR:

George Webster

BY

Joshua Pusey
ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE WEBSTER, OF CHRISTIANA, PENNSYLVANIA.

PHONOGRAPH.

No. 799,122.

Specification of Letters Patent.

Patented Sept. 12, 1905.

Application filed April 12, 1904. Serial No. 202,758.

To all whom it may concern:

Be it known that I, GEORGE WEBSTER, a citizen of the United States, residing at Christiana, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in Phonographs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

10 Figure 1 is a plan view of as much of an Edison phonograph as is necessary to illustrate my invention, which is shown applied thereto. Fig. 2 is a section on line *x x*, Fig. 1. Fig. 3 is a view similar to Fig. 2, but
15 showing the cam on the worm-shaft in the position of having just elevated the arm which carries the reproducing devices and the lower end of the rod carried thereby in engagement with the screw-thread of said worm-shaft.
20 Fig. 4 is a section on line *y y*, Fig. 1. Fig. 5 is a detail of the lower end of the arm 13 and the rod 12 carried thereby, showing the lower end of the latter in engagement with the shorter slot in said arm. Fig. 6 is a
25 similar view to Fig. 5, but showing the rod 12 rotated to engage the longer slot of the arm 13.

The object of this invention is to provide a simple and efficient device for phonographs
30 whereby the record may be readily caused to be repeated in whole or in part.

The invention resides in a novel combination of mechanism, as hereinafter described and particularly pointed out.

35 In the accompanying drawings I have shown my invention as applied to the well-known Edison type of phonograph. 1 is the driven shaft of such machine, having the screw-threaded portion 1^a, which shaft carries the
40 cylinder 2, that receives the record-cylinder 3. 4 is the rock-sleeve that carries the arm 6, upon the free end of which within the annular opening 6^a is the usual reproducing device. (Not shown.) The rock-sleeve 4 is
45 adapted to slide on the usual guide-bar 5 and also carries the arm 7, having a partial screw-thread on the under side of its free end to engage the screw-thread part of shaft 1.

In carrying out my invention I mount upon
50 the shaft 1 a gear 8 and journal in the frame of the machine a shaft 9 parallel with and opposite the cylinder 2 and having a screw-thread 9^a and a gear 10 engaging the gear 8. Shaft 9 has secured thereto a cam 11, whose
55 function will hereinafter appear. For con-

venience the shaft 1 will be referred to as the "main shaft" and shaft 9 as the "repeater-shaft."

60 Connected to the arm 6 is a rod 12, that passes freely through an arm 13, that is fixed to arm 6. The lower end of this rod is bent to form a limb 12^a, that projects through an end slot 14 in the bar, and the free end 12^b of said limb is upturned and is adapted at a pre-
65 determined point in the advance movement of arm 6 to engage the screw-thread of the repeater-shaft 9, as and for a purpose hereinafter explained. In the present instance the upper end of said rod is pressed upwardly by
70 a flat spring 15, that is fastened to the extension 6^b of arm 6, the rod passing freely through the spring and a pin 16 being driven transversely through the end of the rod projecting beyond the spring. This spring serves to
75 maintain the limb 12^a of the rod against the upper wall of the slot 14, yet permitting a slight yielding of said rod under certain conditions hereinafter explained. The arm 13
80 has a projection or, preferably, a small roller 17, against which at a certain time in the outward movement or advance of the arm 6 the before-mentioned cam 11 is adapted to im-
85 pinge and force upwardly said arm 13, and consequently the rod 12 and arm 6.

A plate 18 is mounted on a rock-shaft 19,
90 pivoted to lugs or projections 20 of the frame of the machine. The tendency of this plate by reason of its gravity is to bear against a horizontal bar 21 of the machine-frame, which bar forms a stop for limiting the movement
95 of the plate in that direction, as seen in Fig. 3. The inner end of this plate has an outwardly-inclined or cam projection 22. When the arm 6 is raised, (at which time the sound-reproducing device carried thereby is out of
100 engagement with the record 3 on cylinder 2 and the screw-threaded portion of arm 7 is also out of engagement with the screw-thread 1^a of shaft 1,) the upper edge or end of the vertical part of plate 18 will take under the end
105 of arm 6, while the outwardly-inclined or cam projection 22 will extend beyond the line of said end of the arm, as clearly seen in Fig. 3. When, however, the arm 6 is in position
110 in which the reproducing device is in engagement with the record, the said plate will occupy the position shown in Fig. 2, ready to drop to the position of Fig. 3 as soon as the arm 6 is again raised.

Having described the construction of my in- 110

vention, (omitting details relating to certain adjustments hereinafter described,) I proceed to explain the mode of operation thereof as follows: When the arms 6 and 7 are advancing and the reproduction of a record is taking place, the free end 6^a of the bar 6 is sliding upon the frame-bar 21, as in Figs. 1 and 2, at which time the upturned end 12^b of the limb 12^a of rod 12 is out of engagement with the thread of the repeater-shaft and the plate 18 is in the outward position. As seen in Fig. 2, the arm 6 has arrived at a point in its advance movement when the roller 17 of arm 13 is brought opposite the cam 11 on the repeater-shaft. As the latter continues its rotation said cam will contact with the roller, and so force up the arm 13, thereby carrying the upturned end of the rod 12 into engagement with the screw-thread of the repeater-shaft and at the same time raising the arm 6, and so carrying the reproducing device out of contact with the record as also the arm 7 out of the thread of the rotating shaft 1. The raising of the arm 6 permits plate 18 to drop back by its gravity against the bar 21 and the upper edge to take under the end of said arm, as in Fig. 3. The end of rod 12 being in the thread of the repeater-shaft and the latter rotating in a direction opposite to that of the main shaft and the free end of arm 6 now resting upon the plate 18 and sliding on the top edge of the latter will be caused to travel back until it finally passes off the said edge and drops against the cam projection 22, thus forcing the plate to the outward position, the arm 6 finally resting upon the bar 21, as in Fig. 2. The descent of said arm 6 disengaging the upturned end of rod 12 from the screw-thread of the repeater-shaft and at the same time engaging the screw-thread portion of arm 7 with the complementary portion of shaft 1 and the reproducing device with the record-cylinder 3, the machine proceeds in the usual way until cam 11 again throws up the arm 6, as before. If it should happen that when the latter movement takes place the upturned end of rod 12 be not in position to instantly enter the screw-thread of the repeater-shaft, it will be held against the plane surface of the latter until the screw-thread comes in line with said end of the rod, when the latter will be carried into the thread by the stress of the spring 15.

It is sometimes desirable to repeat only a part of the record. To do this I provide two adjustments, one of which for, so to say, cutting out the first part of the record and the other the end portion thereof. To effect the former, I make the plate 18 longitudinally adjustable, which is done by making it slidable upon the rock-shaft 19 and using a set-screw 23 to lock it in the proper position to which it is adjusted. To effect the second adjustment, I secure the cam 11 adjustably to the repeater-shaft by mounting said cam on a sleeve 24, Figs. 1 and 4, that is longitudinally slidable upon said

shaft and fixable at any point, said sleeve having a slot 25, through which passes a binding-screw 26, that is screwed into said shaft.

I remark that it is not absolutely essential that the rod 12 be used, although much preferable, as a yielding projection from the arm 13 could be provided to engage the screw-thread of the repeater-shaft at the required time—that is, when said arm 13 is elevated by the cam 11 on said shaft. An advantage, however, in using said rod 12 results from the following arrangement: As in the present instance a portion of the limb 12^a of rod 12 extends beneath the repeater-shaft and it being sometimes necessary to throw back the arm 6 or if it be desired that the end 12^b shall not engage the thread of the repeater-shaft when the arms 13 and 6 are elevated by the cam 11 I make in the end of the arm 13 a slot 27 shorter than slot 14 and at right angles thereto, as seen in Figs. 5 and 6. By pressing down the rod 12, the spring 15 permitting it to yield sufficiently to carry limb 12^a below slot 14, and giving the rod a quarter-turn and then releasing the pressure the said limb 12^a entering the slot 27 will then be out of line with the repeater-shaft and will be maintained in that position.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a phonograph, the combination with the rotatable record-carrying shaft, and the arm carrying the reproducing device, the screw-threaded repeater-shaft geared with the first-mentioned shaft, the rod connected to said arm and adapted to engage the screw-thread of the repeater-shaft; the cam on the latter shaft adapted to engage a projection on said arm and to elevate the latter at a predetermined point in its advance movement; the rock-plate adapted to engage under said arm when the latter is elevated by said cam, and having the end cam incline whereby said arm is caused to automatically throw said plate out of said engaging position at a predetermined point, substantially as set forth.

2. In a phonograph, the combination with the rotatable record-carrying shaft and the arm carrying the reproducing device, of the screw-threaded repeater-shaft geared with the first-mentioned shaft, said arm having a part adapted to engage the screw-thread of the repeater-shaft; the cam on the latter shaft adapted to engage a projection on said arm, and to elevate the latter at a predetermined point, the plate adapted to automatically engage under said arm when the latter is elevated by said cam, means for automatically throwing said plate out of said engaging position at a predetermined point, together with means for effecting adjustments of said cam longitudinally of the repeater-shaft, substantially as set forth.

3. In a phonograph, the combination with the rotatable record-carrying shaft and the arm carrying the reproducing device, of the

screw-threaded repeater-shaft geared with the first-mentioned shaft, said arm having a part adapted to engage the screw-thread of the repeater-shaft; the cam on the latter shaft adapted to engage a projection of said arm, and to elevate the latter at a predetermined point, the plate adapted to automatically engage under said arm when the latter is elevated by said cam, means for automatically throwing
5 said plate out of said engaging position at a

predetermined point, together with means for effecting longitudinal adjustments of said plate, substantially as set forth.

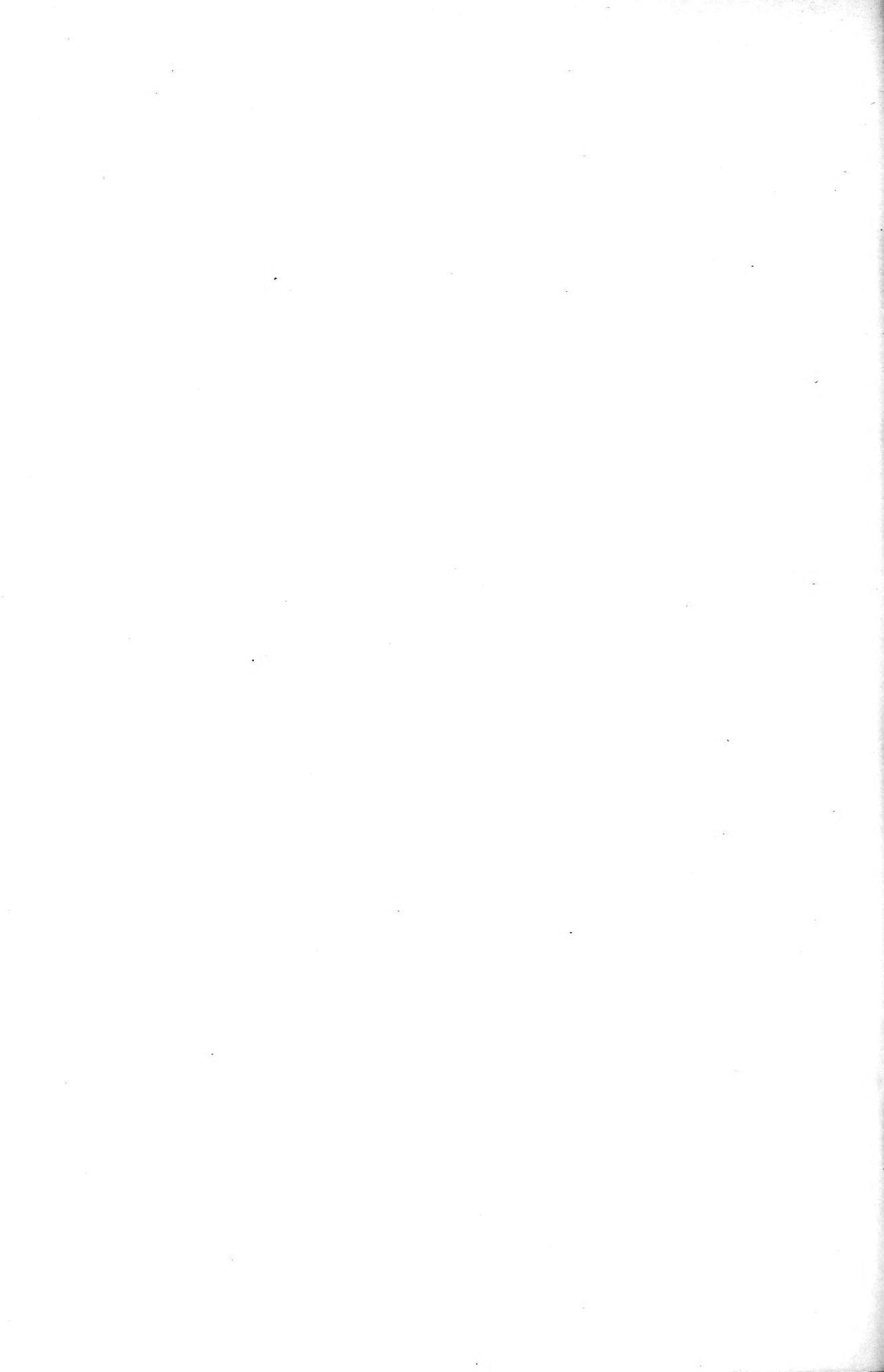
In testimony whereof I have hereunto affixed my signature this 6th day of April, A. D. 15
1904.

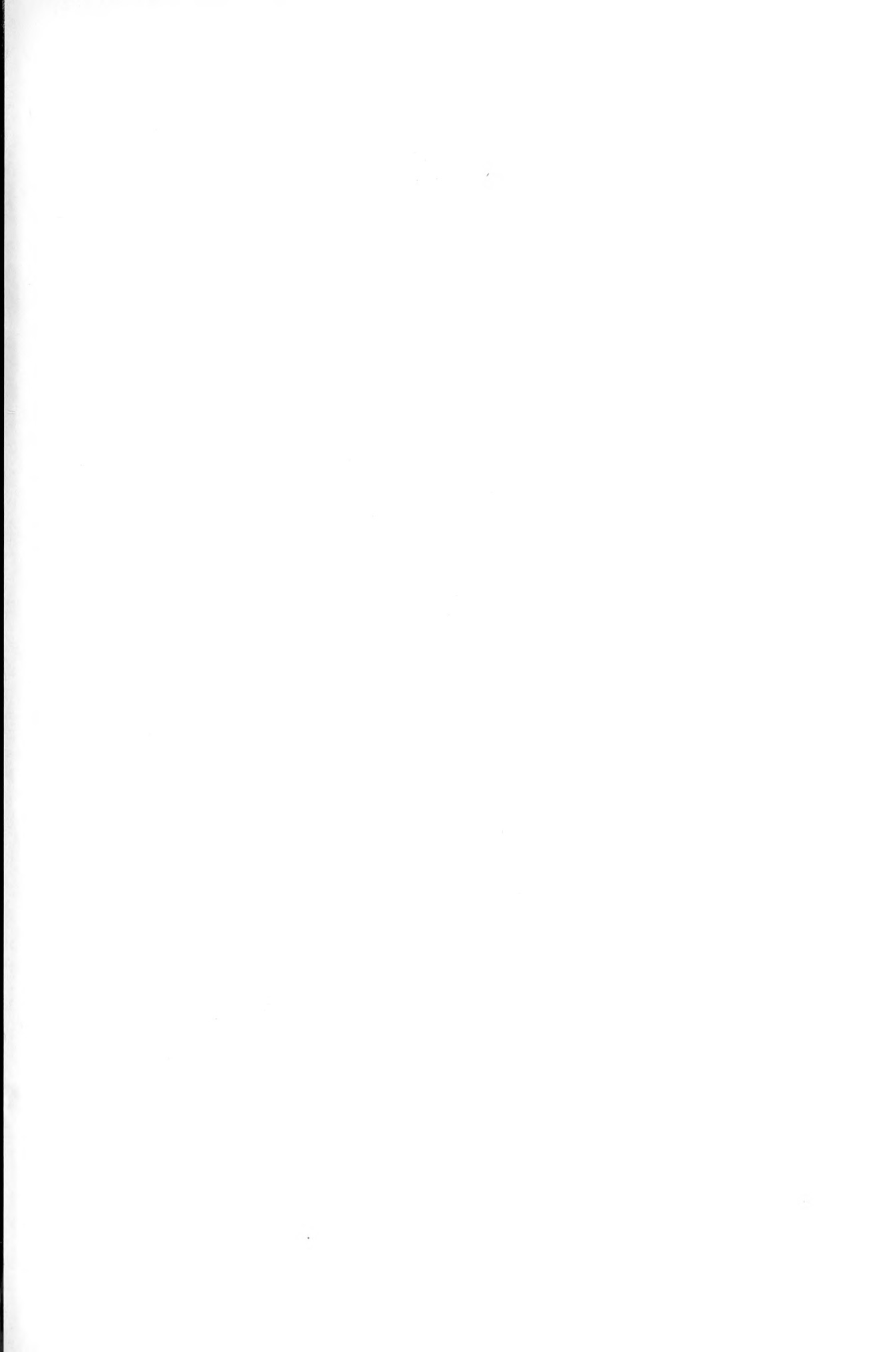
GEORGE WEBSTER.

Witnesses:

J. A. HARRAR,

J. D. HARRAR.





R. B. SMITH.
SOUND AMPLIFIER PHONOGRAPH.

APPLICATION FILED APR. 19, 1905.

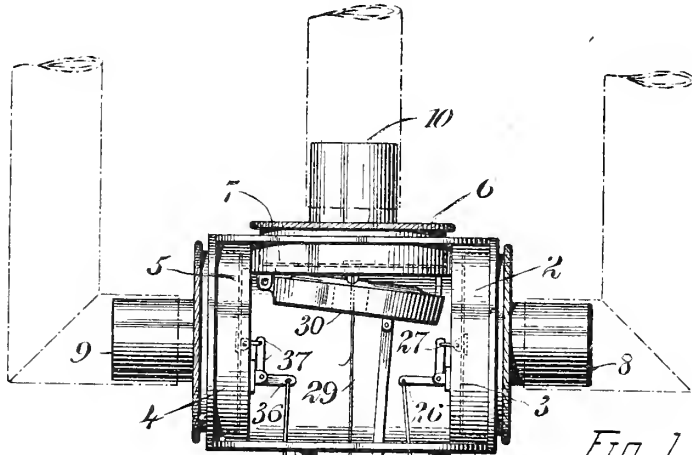


Fig. 1.

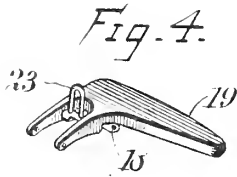


Fig. 4.

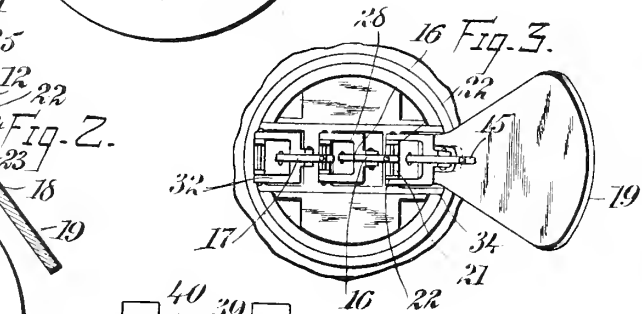
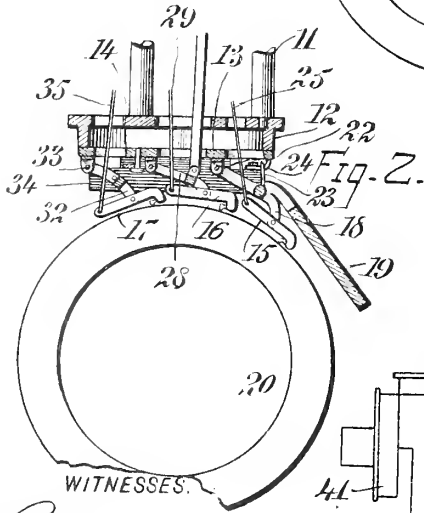
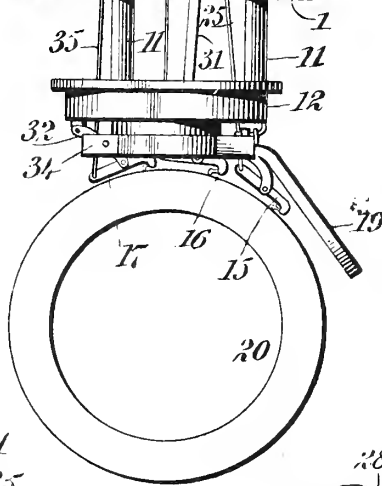


Fig. 3.

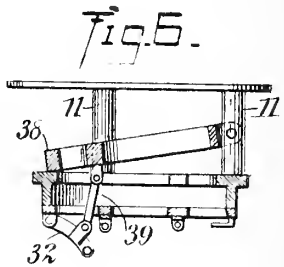


Fig. 5.

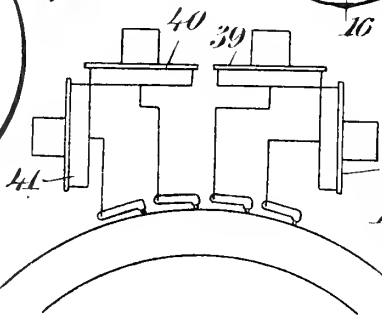


Fig. 5.

WITNESSES.

A. Appleman
C. A. Ferguson

INVENTOR
Richard B. Smith

BY *[Signature]*
ATTORNEYS

UNITED STATES PATENT OFFICE.

RICHARD B. SMITH, OF DARLINGHURST, SYDNEY, NEW SOUTH WALES,
AUSTRALIA.

SOUND-AMPLIFIER PHONOGRAPH.

No. 799,412.

Specification of Letters Patent.

Patented Sept. 12, 1905.

Application filed April 19, 1905. Serial No. 256,355.

To all whom it may concern:

Be it known that I, RICHARD B. SMITH, a subject of the King of Great Britain, and a resident of Darlinghurst, Sydney, Colony of New South Wales, Australia, have invented a new and Improved Sound-Amplifier for Phonographs, of which the following is a full, clear, and exact description.

This invention relates to improvements in devices for amplifying sounds from phonographs or like machines, an object being to provide a reproducer comprising a plurality of diaphragms so arranged as to be acted upon synchronously, whereby the sounds from the several diaphragms will be so blended as to be emitted from the sound-horn as a single sound, and much more distinct than is possible with the ordinary reproducer.

I will describe a sound-amplifier for phonographs embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a sound-amplifier for phonographs with a portion of the casing removed. Fig. 2 is a sectional view of a portion thereof carrying the record-points. Fig. 3 is an end view thereof. Fig. 4 is a perspective view of one of the weights employed. Fig. 5 is a modification diagrammatically illustrated, and Fig. 6 shows another modification.

Referring to the drawings, 1 designates the casing, that may be cylindrical, as shown, or of any other desired form. In one end of the casing 1 is a holder 2, having a diaphragm 3, and in the opposite end is a holder 4, having a diaphragm 5. Arranged at right angles to the holders 3 4 is another holder 6, which extends through an opening in the casing-wall and supports a diaphragm 7. The covers of the several diaphragm-holders are respectively provided with short tubes 8 9 10, from which branches are designed to lead to the sounding-horn of the phonograph.

Connected by means of posts 11 with the casing 1 is a base-plate 12, which is shown substantially in the form of a ring and supports in its lower portion cross-bars 13 14. The record-points for the three diaphragms are indicated at 15 16 17. The point 15 is

pivoted between fingers 18, extended downward from a plate-like weight 19, designed to hold the point 15 yieldingly in contact with a cylinder 20. The inner end of this weight 19 is bifurcated, and the two members are mounted to swing on a pin 21, supported in lugs 22 on the cross-bar 13. The weight 19 is prevented from moving too far downward toward the record-cylinder by means of a link 23, designed to engage with a hook 24. From the part of the point 15 extended inward from its downwardly-extended end a wire 25 extends into the casing 1 and connects one arm of an angle-lever 26, the other arm of said angle-lever having a link connection 27 with the diaphragm 3. The point 16 is mounted to swing in a frame 28, pivoted to the cross-bar 14, and from the end of the point 16 opposite its downwardly-turned end a wire or rod 29 extends to a connection with the diaphragm 7, and mounted to swing in the holder for this diaphragm 7 is a ring-like weight 30, which has a rod connection 31 with the frame 28, and thus this weight serves to yieldingly hold the point 16 against the cylinder. The point 17 is mounted to swing in a frame 32, pivoted to lugs 33, and also pivotally connected to this frame is a weight 34, which has swinging connection with the hook 23 or with the opposite side of the plate 22. From the outer end of the point 17 a wire or rod 35 extends and connects with one arm of an angle-lever 36, the other arm of which has a link connection 37 with the diaphragm 5.

In the operation the several points will be placed in the same channel or groove in the record-cylinder, so that when the cylinder is rapidly rotated the several points will be operated altogether, and consequently impart like vibratory motion to the several diaphragms.

In Fig. 5 I have diagrammatically shown four diaphragm-holders 38 39 40 41, all having connections, substantially as before described, with the points.

Instead of the weight 34, mounted as described, I may employ a weight 38, pivoted to one of the posts 11 and having link connection 39 with the frame 32, as indicated in Fig. 6.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A sound-amplifier for phonographs comprising a plurality of record-engaging points,

a plurality of diaphragms certain of said diaphragms being arranged with their faces parallel, and another one arranged at right angles thereto, a single casing in which the several diaphragms are arranged and connections between the engaging points and the diaphragms.

2. A sound-amplifier for phonographs comprising a plurality of record-engaging points arranged substantially in a straight line, a casing, a plurality of diaphragms supported in the casing, one being arranged at right angles to the others connections between the diaphragms and the points, and means for yieldingly holding the points against the record.

3. A sound-amplifier for phonographs comprising three record-engaging points arranged in a row, a casing, diaphragm-holders arranged in opposite walls of said casing, diaphragms in said holders, angle-levers having connection with the diaphragms, rods connecting said angle-levers with their actuating-points, a holder arranged in the cylinder at substantially right angles to the first-named holders, a diaphragm in said last-named holder,

and a rod connection between said diaphragm and one of the points. 25

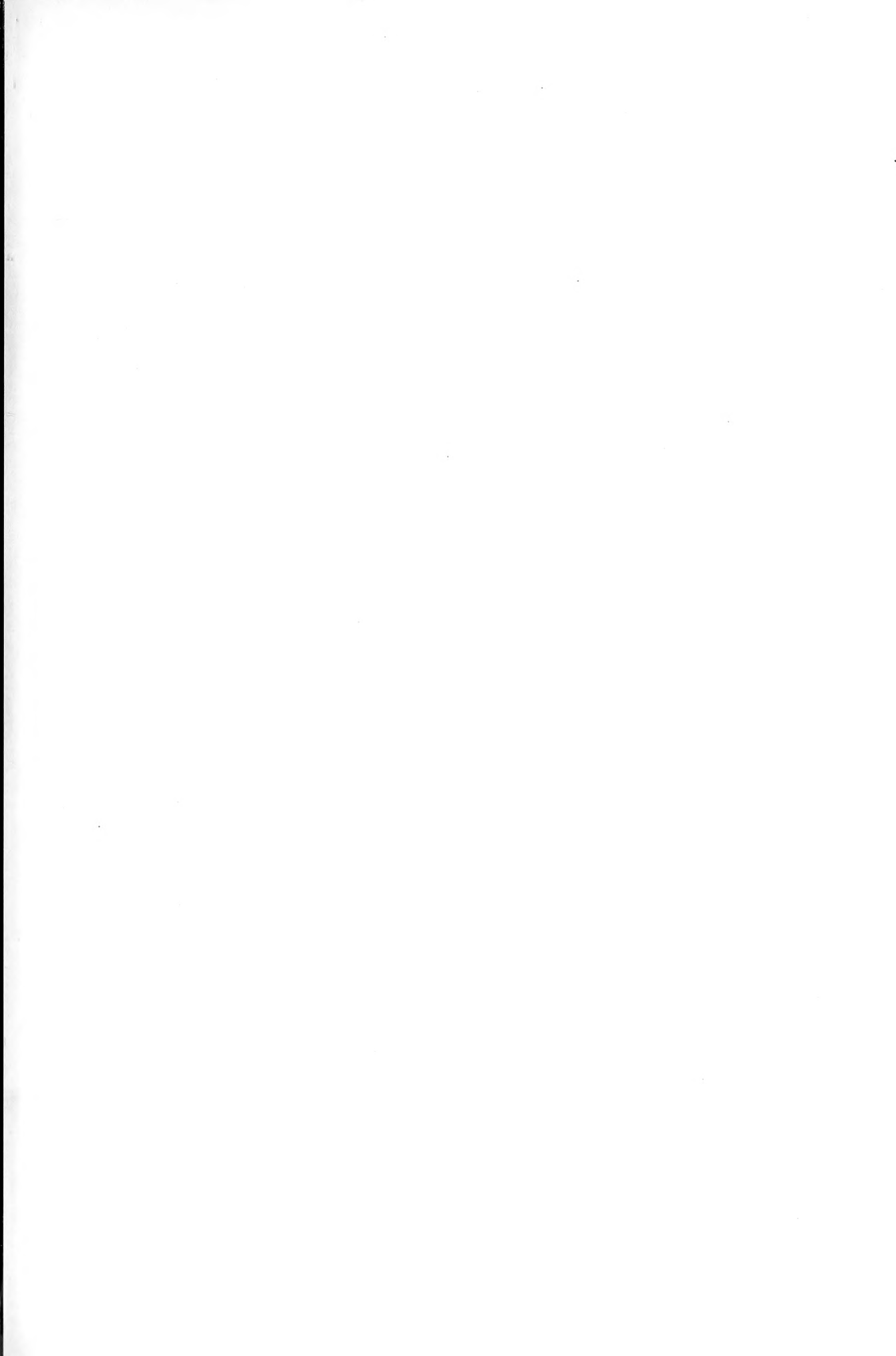
4. A sound-amplifier for phonographs, a casing, holders removably placed in opposite ends of said casing, a holder removably arranged in the upper portion of the casing at right angles to the first-named holders, diaphragms in the holders, record-engaging points arranged substantially in a straight line and weighted, angle-levers having their vertical portions connected to the end diaphragms, connections between the horizontally-disposed portions of said angle-levers and record-engaging points, and a connection between the horizontally-disposed diaphragm and the central record-engaging point. 30 35 40

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD B. SMITH.

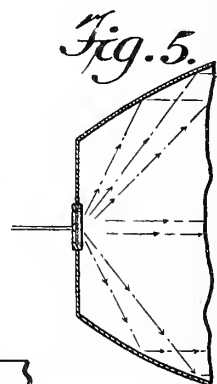
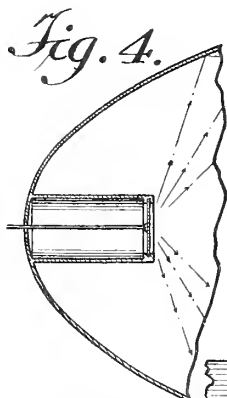
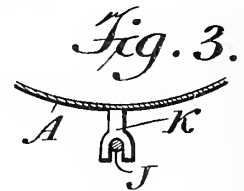
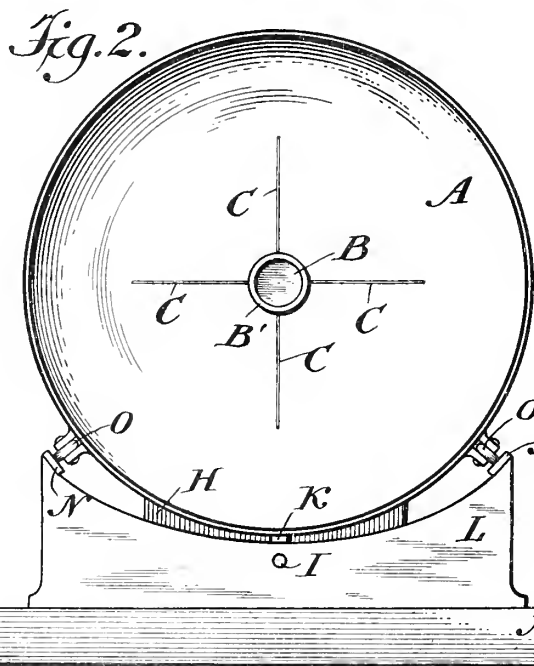
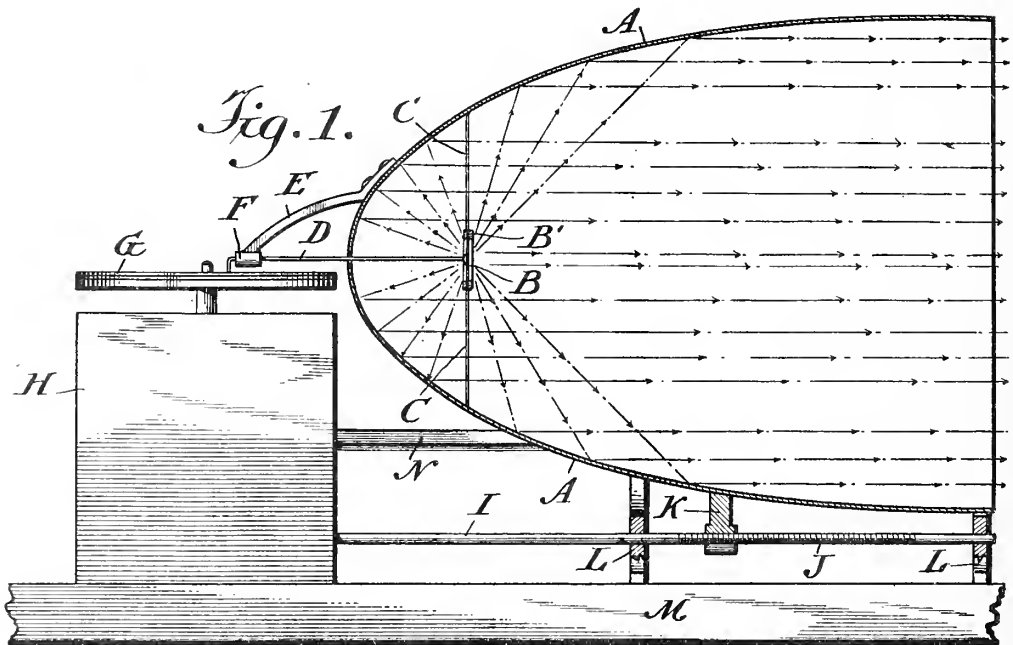
Witnesses:

JNO. M. RITTER,
C. R. FERGUSON.



R. A. ANTHONY.
TALKING MACHINE.

APPLICATION FILED OCT. 20, 1904.



Witnesses
A. Appleman
F. M. Doushach

Inventor
Richard A. Anthony.
 By his Attorney, *Phillips Abbott.*

UNITED STATES PATENT OFFICE.

RICHARD A. ANTHONY, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO AMELIA V. V. ANTHONY, OF NEW YORK, N. Y., AND ONE-HALF TO ALBERT R. LEDOUX, OF CORNWALL-ON-THE-HUDSON, NEW YORK.

TALKING-MACHINE.

No. 799,773.

Specification of Letters Patent.

Patented Sept. 19, 1905.

Application filed October 20, 1904. Serial No. 229,218.

To all whom it may concern:

Be it known that I, RICHARD A. ANTHONY, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Phonographs, Gramophones, and Similar Machines or Apparatus Known Generally as "Talking-Machines," of which the following is a description, reference being had to the accompanying drawings, in which—

Figure 1 illustrates an elevation, partly in vertical section, of the invention. Fig. 2 illustrates an elevation of that which is shown in Fig. 1 seen from the right. Fig. 3 illustrates a detail of construction. Figs. 4 and 5 illustrate vertical sectional views of modified constructions.

In machines of the class stated the horns as heretofore made have been of a gradually-tapering contour having a bell-shaped mouth somewhat resembling the body part and bell of an ordinary cornet. Tone-waves or atmospheric vibrations in their passage through a horn so shaped are by their impingement against the conical sides of the interior deflected from side to side of the horn at angles other than those which would project them in parallel lines straight from its mouth, with the result that the tone-waves or atmospheric vibrations to a greater or less extent, at least, cross one another, thus interfering with and tending to break up the uniform rhythmic motion of the pulsations. Thus the sound or tone when it reaches the ear of an auditor is more or less confused or pulsatory. This effect in a talking-machine is objectionable, because there words, intonations, accents, and verbal peculiarities or individualities should be not only audible, but clearly distinguishable, and the crossing of the vibrations above alluded to tends to break up and confuse the vibrations, so that the quality of the tone produced is partially and in some cases wholly destroyed, and the spoken words are frequently not distinguishable nor the voice or tone of the person speaking recognizable.

Under my invention I materially alter the shape or contour of the horn, giving to it the general shape of a parabola, and I locate the diaphragm or tone-producing device of the instrument in or near what is called the "focus" of the parabola, so that the tone-

waves projected by it impinging upon the interior walls of the parabola are deflected thereby at such angles that they pass in parallel lines directly forward out from the mouth of the horn.

Referring now to the mechanical construction of the invention, I illustrate the essential parts only. The details may be arranged in a great variety of forms. Indeed those shown by me are examples only of many ways in which the apparatus may be constructed. I therefore do not limit myself in any particular so far as details of construction are concerned.

Referring to Figs. 1, 2, and 3, A represents the horn of the parabolic form described. B is the diaphragm, which may be supported by a frame B', which in turn may be supported in any suitable manner—as, for example, by tightly-stretched fine wires C C, which are soldered or otherwise attached to the interior of the horn. D is the diaphragm-needle. E is an arm supported by the horn, as shown, provided with a sleeve F for a purpose hereinafter described, through which the needle passes and in which it moves. G is the turn-table or disk or in a cylinder machine the cylinder. H is a box or casing containing the motor. I is a spindle having a worm J cut thereon, and K is a stud or nut attached to the horn, which has a worm-thread cut in it to engage with the worm J. L L are the supports for the horn. M is any suitable base for the entire apparatus. N N are two tracks or suitable surfaces resting upon the supports L L. O O are rollers, (there may be two on each side of the horn,) which rest lightly on the surfaces N N for the support of the horn, needle, and diaphragm.

I prefer to make the stud or nut K as shown in Fig. 3—that is to say, open at the bottom and having the worm-threads cut in its upper arc only, so that when it is desired to "run the horn back," as it is called, its front end may be lifted until the threads of the worm J and the nut K are separated, whereupon the horn and attached parts may be quickly moved to any desired position.

The operation is obvious. A suitable motor inclosed within the casing H rotates the turn-table G and at properly-regulated speed likewise turns the worm-shaft I upon its axis, so that as the needle D makes its transit

through the grooves, depressions, &c., on the face of the turn-table the horn will likewise by corresponding movement be carried forwardly or rearwardly, as required.

5 In Fig. 4 I show a modified construction in which the diaphragm is supported on the end of a tube P, which is attached to the rear end of the horn. Under this construction all vibrations from the rear side of the diaphragm
10 are cut off by the tube P and do not form part of the volume of sound projected forwardly through the horn, those which are thrown off by the front side of the diaphragm only being projected outwardly toward the audience.

15 In Fig. 5 I show still another modification, in which the rear end of the horn is removed, as shown. In other words, the parabola is truncated. The diaphragm in this construction is or may be supported by tightly-
20 stretched wires connected with the frame of the diaphragm and with the sides of the horn, as shown. In this construction the vibrations which are thrown off by the rear side of the diaphragm pass outwardly through the
25 open space in rear thereof and are dissipated in the air and do not conflict with those that are thrown forwardly and projected from the mouth of the horn, as stated.

In small or light apparatus it will not always be necessary to employ the worm and
30 coacting parts, because if the horn be pivoted, as usual in light apparatus, the impingement of the needle in the irregularities upon the face of the turn-table will afford sufficient
35 power to automatically move the horn and attached parts, and to aid in this result I may provide the sleeve F with such appliances as will aid the needle in so doing.

Having described my invention, I claim—
40 1. In sound-projecting apparatus a horn having the interior contour of a parabola and a diaphragm or tone-producer immovably fixed at practically the focus thereof.

2. In sound-projecting apparatus a horn
45 having the interior contour of a parabola, the

rear end of which is closed, and a diaphragm or tone-producer immovably fixed within the horn at practically the focus thereof.

3. In a sound-projecting apparatus a horn having the interior contour of a parabola, and a diaphragm immovably fixed at practically
50 the focus thereof, and means whereby the horn and its attached parts may be positively moved relative to the turn-table or cylinder.

4. In sound-projecting apparatus a horn having the interior contour of a parabola, a diaphragm located at practically the focus of the parabola, and means to support the same,
55 no part of which is in advance of the diaphragm.

5. In sound-projecting apparatus a horn having the interior contour of a parabola, a diaphragm located at practically the focus of the parabola, and means, such as fine wires,
60 for fixedly supporting the diaphragm-frame within the horn.

6. In sound-projecting apparatus a horn, the interior surface whereof in advance of the diaphragm or focus has the contour or outline of a parabola and a diaphragm or tone-
70 producer located at or near the said focus.

7. In sound-projecting apparatus a diaphragm or tone-producer located within the horn and means to prevent the vibrations from the rear side of the diaphragm entering
75 the horn.

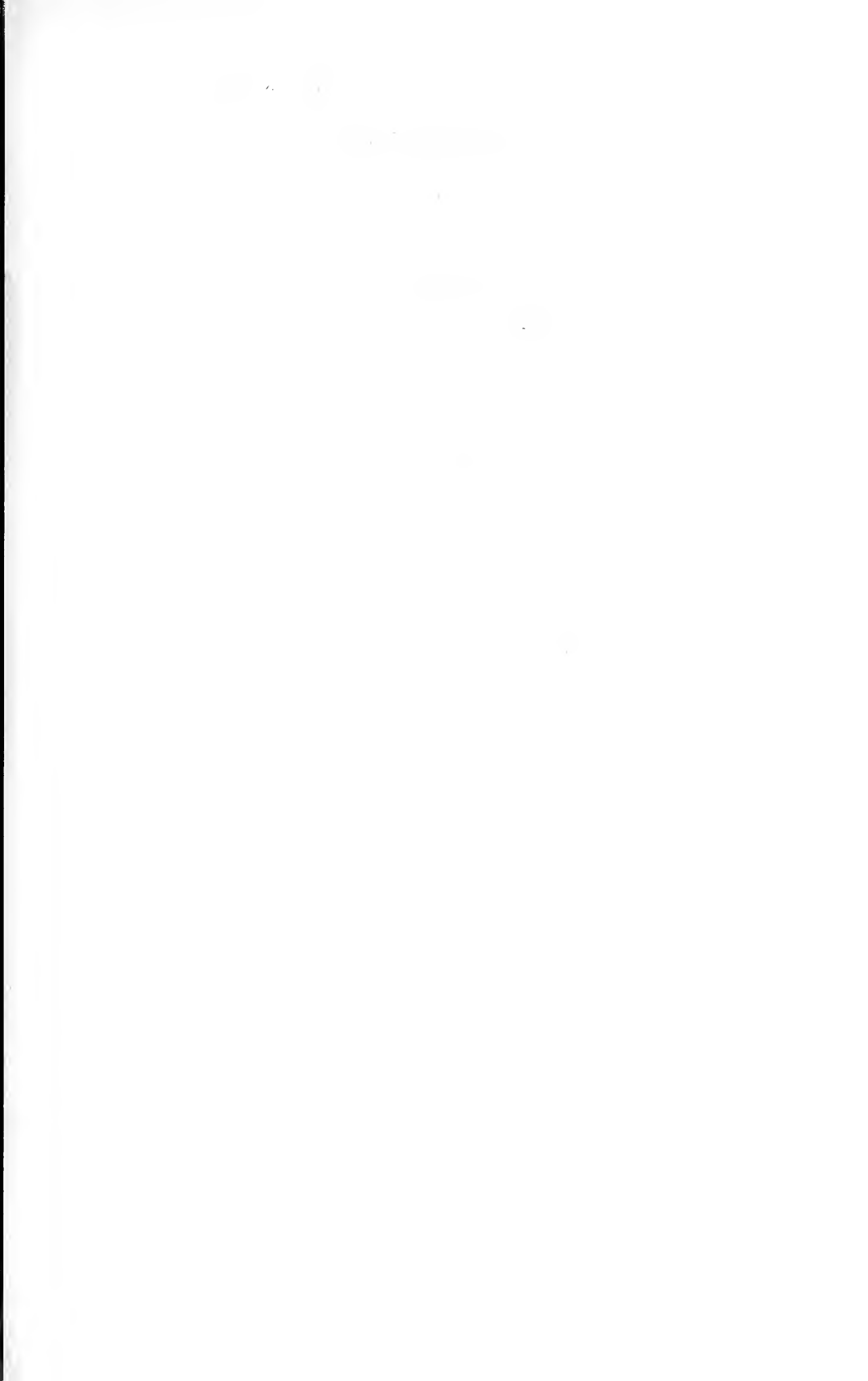
8. In sound-projecting apparatus a horn having the general interior outline or contour of a parabola, a diaphragm or tone-producer located at or near the focus thereof and a tubular support for the diaphragm which prevents the vibrations projected by the rear side of the diaphragm from entering the horn.
80

In testimony whereof I have signed my name to this specification in the presence of
85 two subscribing witnesses.

RICHARD A. ANTHONY.

Witnesses:

PHILLIPS ABBOTT,
F. M. DONSBACH.



F. N. FOSTER.
GRAPHOPHONE MODULATOR.
APPLICATION FILED DEC. 19, 1904.

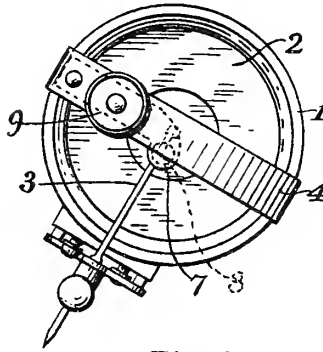


Fig. 1.

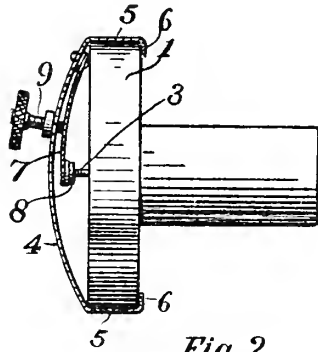


Fig. 2.

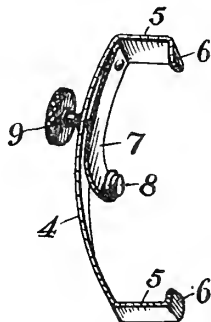


Fig. 3.

Witnesses

Edward R. Monroe.

Georgiana Chase

Inventor

Frank N. Foster

By *Luther V. Morelton*
Attorney

UNITED STATES PATENT OFFICE.

FRANK N. FOSTER, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR OF TWO-FIFTHS TO W. CLAUD PRICE, OF GRAND RAPIDS, MICHIGAN.

GRAPHOPHONE-MODULATOR.

No. 799,898.

Specification of Letters Patent.

Patented Sept. 19, 1905.

Application filed December 19, 1904 Serial No. 237,432.

To all whom it may concern:

Be it known that I, FRANK N. FOSTER, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Graphophone-Modulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in devices for modulating the sound of a graphophone; and its object is to provide a simple, cheap, and effective device that may be readily attached to the sound-box of the graphophone as ordinarily constructed and to provide the device with various new and useful features hereinafter more fully described, and particularly pointed out in the claims.

My invention consists, essentially, of a suitable support adapted to be readily attached to the sound-box of a graphophone, a yielding member mounted on said support and adapted to yieldingly engage the stylus-bar of the graphophone, and means for adjusting the tension of said member to vary the tension of the disk, whereby the action of the sound-producing mechanism may be more or less modified at pleasure and whereby the device may be readily and quickly applied and detached, as occasion requires, as will more fully appear by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of the sound-box of a graphophone with my device attached thereto; Fig. 2, a plan view of the same, and Fig. 3 a perspective detail of my device detached.

Like numbers refer to like parts in all of the figures.

1 represents the sound-box of a graphophone as usually constructed; 2, the vibrating disk thereof; 3, the bar which vibrates the disk. My device consists of a suitable clamp or support 4, having a yielding curved middle portion and provided with rearwardly-bent portions 5 adapted to embrace the opposite sides of the sound-box 1 and inwardly-turned ends 6 to engage the rear of the sound-box, whereby a detachable support is provided that will yieldingly engage the oppo-

site sides of the sound-box and extend transversely across the front of the same.

7 is a flexible member consisting of a strip of suitable material secured at one end to the support 4 and extending at its free end opposite the stylus-bar 3 and provided at this end with a suitable elastic pad 8 to yieldingly engage said bar. This member 7 is provided with a suitable means of adjusting its tension, preferably consisting of a thumb-screw 9, extending through a threaded opening in the support 4 and engaging the said member. By turning this screw more or less pressure of the pad 8 will be brought to bear upon the bar 3, and thus its vibration is more or less restricted and the tension of the disk 2 varied as occasion may require, the effect being to modify the action of the sound-producing mechanism of the graphophone at pleasure by adjusting the screw 9.

It is obvious from the foregoing description that this device is readily attached to the sound-box of the graphophone as usually constructed and quickly adjusted to vary and modify the operation of the sound-producing mechanism thereof.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A modulator for a graphophone comprising a support adapted to yieldingly embrace a sound-box and extend across the front of the same, a yielding member attached to said support at one end and provided with an elastic pad at the other end adapted to engage the stylus-bar of the graphophone, and an adjusting-screw in the support and engaging said member.

2. The combination of a support comprising a curved middle portion embracing end portions and inwardly-turned ends, a flexible member attached at one end to the support, an elastic pad on the other end of said member, and an adjusting-screw extending through a threaded opening in said support and engaging said elastic member.

3. The combination of a support having opposing and yielding portions to embrace the opposite sides of a sound-box and adapted to extend across the front of said box, an elastic pad to yieldingly engage the stylus-bar of the same, and means for adjusting the pressure of said pad against said bar.

4. In combination with a graphophone
sound-box having a stylus-bar, a detachable
support extending wholly across the front of
the sound-box, a yielding member attached
5 to the support and engaging the stylus-bar of
the sound-box, and means for adjusting the
yielding member.

5. The combination of a support having
opposing members adapted to embrace the
10 sound-box of a graphophone, a flexible mem-

ber mounted on the said support, an elastic
pad on said flexible member to engage a
stylus-bar, and means for adjusting the ten-
sion of the flexible member.

In testimony whereof I affix my signature 15
in presence of two witnesses.

FRANK N. FOSTER.

Witnesses:

LUTHER V. MOULTON,
GEORGIANA CHACE.



No. 800,331.

PATENTED SEPT. 26, 1905.

C. C. SHIGLEY & S. H. PAXTON.
RECORD ROLL FOR PHONOGRAPHS.

APPLICATION FILED NOV. 9, 1903.

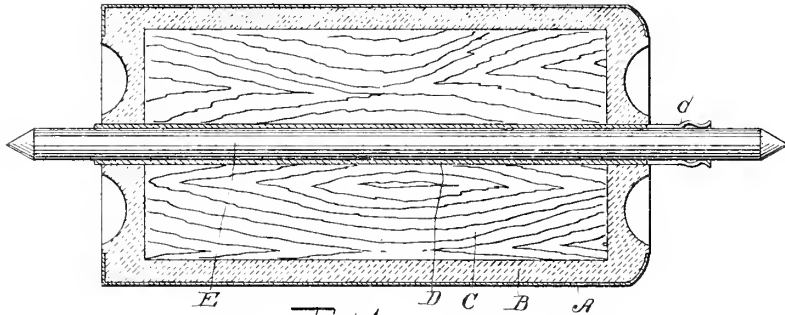


Fig. 1

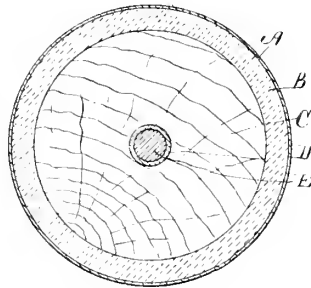


Fig. 2

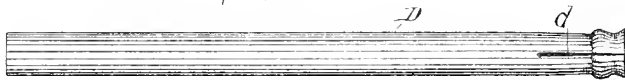


Fig. 3



Fig. 4

Witnesses:

Ethel A. Keller
Geo. W. Earl

Inventors,

Cyrus C. Shigley & Sherman Paxton
By *Fred L. Chapell*
Att'y.

UNITED STATES PATENT OFFICE.

CYRUS C. SHIGLEY AND SHERMAN H. PAXTON, OF HART, MICHIGAN.

RECORD-ROLL FOR PHONOGRAPHS.

No. 800,331.

Specification of Letters Patent.

Patented Sept. 26, 1905.

Application filed November 9, 1903. Serial No. 180,450.

To all whom it may concern:

Be it known that we, CYRUS C. SHIGLEY and SHERMAN H. PAXTON, citizens of the United States, residing at the village of Hart, county of Oceana, State of Michigan, have invented certain new and useful Improvements in Record-Rolls for Phonographs, of which the following is a specification.

This invention relates to improvements in record-rolls for phonographs.

The main object of this invention is to provide an improved record-roll for phonographs which will produce a loud, distinct, and full tone, which is simple in structure, economical to produce, and durable in use.

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of our invention is clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a central longitudinal sectional view through our improved phonograph record-roll, the mandrel-shaft E being shown in full lines. Fig. 2 is a detail cross-sectional view of the structure appearing in Fig. 1. Fig. 3 is a side elevation view of the mandrel-sleeve. Fig. 4 is an end elevation view of the mandrel-sleeve D looking from the right of Fig. 3.

In the drawings similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the cylindrical shell A is formed of celluloid or other suitable composition adapted to receive and retain a phonographic record. This shell A is comparatively thin and is preferably provided with inturned flanges at each end. The shell A is provided with a backing B, of some suitable plastic material, preferably plaster-of-paris, which may be readily poured or cast and is adapted to set or harden at an ordinary temperature.

The core C, which is made of wood or suitable fiber, is of such a size as to leave considerable space between it and the walls of the shell to receive the backing material. The core C is also shorter than the shell A, so that its ends are inclosed by the backing

material B. (See Fig. 1.) The core is mounted upon the mandrel-sleeve or tube D, which projects at both ends. The mandrel-sleeve D is slitted at one end, as at *d*, and is crimped to cause it to grip upon the mandrel or shaft E, which is of even diameter from end to end, except that it is provided with suitable bearing-pivots at each end.

Our improved phonograph record-roll is particularly adapted for use on phonograph-machines, such as is illustrated in Letters Patent of Cyrus C. Shigley, issued May 5, 1903, No. 727,002. The same is, however, adapted for use in other machines.

In assembling our improved record-roll the record is first made upon the shell A. The mandrel-sleeve is then placed in the core C and the shell suitably centered about the same. The plastic backing material B is then poured or cast about the core. This secures the core and the mandrel-sleeve in position, and forms a backing for the thin shell A, which is solid and uniform.

Plaster-of-paris is, as before stated, preferably used for the backing B. This material may be readily poured and is comparatively light in weight. The core C is preferably made of wood, although other materials, such as fiber, may be used and satisfactory results be secured.

Our improved record-roll is very economical to produce and is durable in use.

We have illustrated and described our improved phonographic record-roll in detail in the form preferred by us. We are, however, aware that it is capable of considerable variation in structural details without departing from our invention, and we desire to claim the same specifically as illustrated, as well as broadly.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a phonographic record, the combination of an outer shell of celluloid or other suitable material having inturned flanges at its ends; a mandrel-sleeve having one end thereof crimped and slitted; a core of wood or other suitable material on said mandrel-sleeve; a suitable plastic material molded or cast within said shell about said core; and a mandrel-shaft E, all coacting for the purpose specified.

2. In a phonographic record, the combination of an outer shell of celluloid or other suitable material; a mandrel-sleeve having

one end thereof crimped and slitted; a core of wood or other suitable material on said mandrel-sleeve; a suitable plastic material molded or cast within said shell about said core; and a mandrel-shaft E, all coating for the purpose specified.

3. In a phonographic record, the combination of an outer shell of celluloid or other suitable material having inturned flanges at its ends; a mandrel-sleeve; a core of wood or other suitable material on said mandrel-sleeve; and a suitable plastic material molded or cast within said shell about said core, all coating for the purpose specified.

4. In a phonographic record, the combination of an outer shell of celluloid or other suitable material; a mandrel-sleeve; a core of wood or other suitable material on said mandrel-sleeve; and a suitable plastic material molded or cast within said shell about said core, all coating for the purpose specified.

5. In a phonographic record, the combina-

tion of an outer shell of celluloid or other suitable material having inturned flanges at its ends; a suitable core adapted to receive a mandrel therethrough centrally arranged in said shell; and a plastic material molded or cast within said shell about said core, for the purpose specified.

6. In a phonographic record, the combination of an outer shell of celluloid or other suitable material; a suitable core adapted to receive a mandrel therethrough centrally arranged in said shell; and a plastic material molded or cast within said shell about said core, for the purpose specified.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

CYRUS C. SHIGLEY.
SHERMAN H. PAXTON.

Witnesses:
S. A. SHUFELT,
VENUS HANDY.



T. A. EDISON.

PHONOGRAPH RECORD AND METHOD OF MAKING THE SAME.

APPLICATION FILED JUNE 29, 1904.

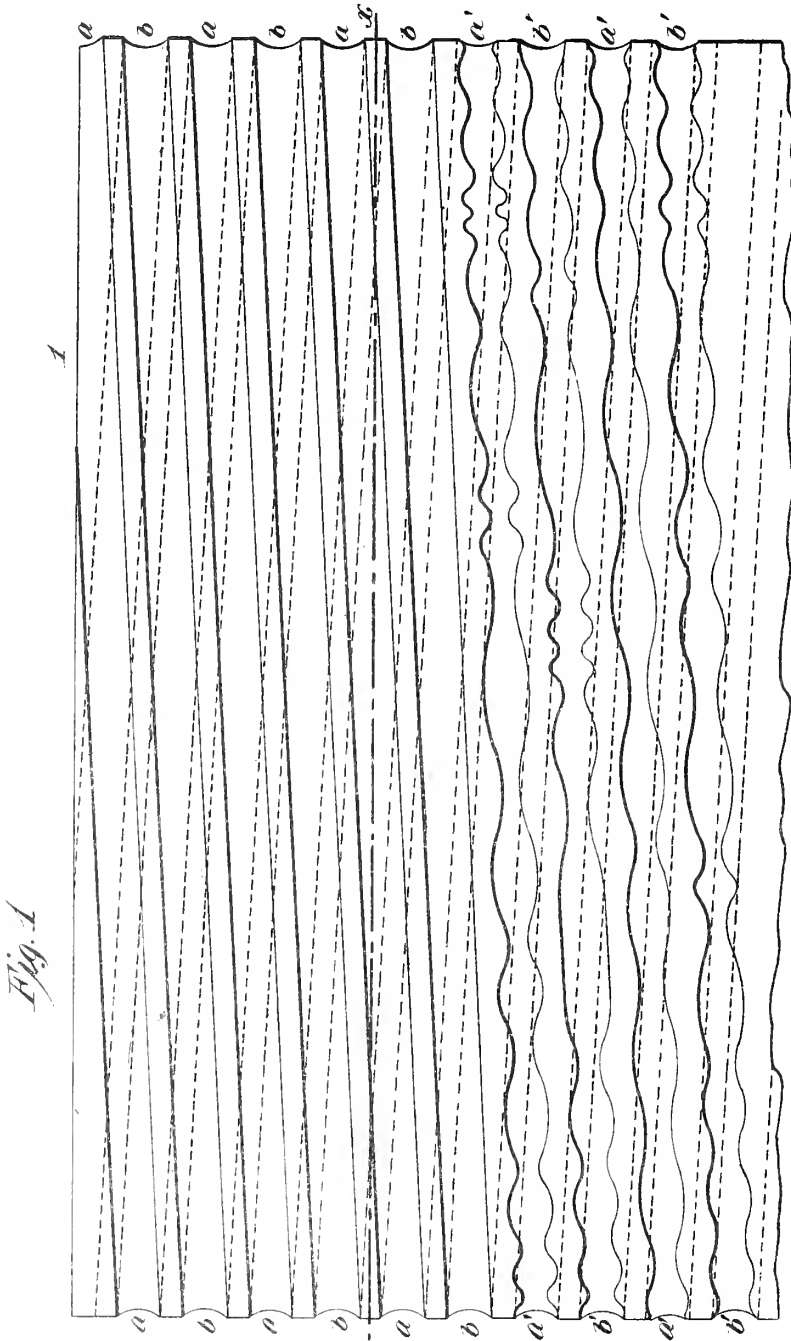


Fig. 1

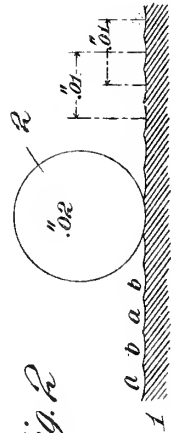


Fig. 2

Witnesses:

Jas. F. Coleman
Harry S. Walters

Inventor

Thomas A. Edison

by *Frank L. Hayes*
 Attorney.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A COR-
PORATION OF NEW JERSEY.

PHONOGRAPH-RECORD AND METHOD OF MAKING THE SAME.

No. 800,800.

Specification of Letters Patent.

Patented Oct. 3, 1905.

Application filed June 29, 1904. Serial No. 214,650.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, county of Essex, and State of New Jersey, have invented a certain new and useful Improved Phonograph-Record and Process of Making the Same, of which the following is a description.

My invention relates, first, to an improved phonograph-record, whether of the cylinder or disk type, in which a plurality of independent record-grooves are formed in the recording-surface, whereby it becomes possible to secure a plurality of phonographic reproductions from the same record, and, second, to an improved process for producing such records.

In an ordinary phonograph-record the available space in which the record-groove may be formed is one one-hundredth of an inch in width, and in this space the very shallow record-groove is cut by a circular recording-tool (actuated by the diaphragm) of about four one-hundredths of an inch in diameter. I find that by properly reducing the diameter of the recording-tool it becomes practically possible to cut as deep a record-groove as that now formed in a space whose width is only half or even one-quarter as great as that now utilized, or from about one two-hundredths to one four-hundredths of an inch. I am therefore enabled to form on a record-surface two or more complete record-grooves, any one of which may be engaged by a proper reproducer-stylus of small diameter, so that a reproduction from any record-groove can be secured. In this way without increasing the size of the records and without changing the reproducing-machines, except to the extent of using a reproducer-stylus of reduced diameter, I am enabled to make use of multiple records with the obvious commercial advantages incident thereto.

The improved process consists in cutting the plurality of record-grooves in the recording material either simultaneously or successively, and it involves a preferred preliminary adjustment of the recording tool or tools in order that the records may not conflict or interfere with one another, but may be entirely independent, so that the reproducer-stylus may be engaged with any one of them throughout the entire reproduction. A record formed in this way can be used directly on a repro-

ducing-machine, or it may be obviously duplicated by any suitable process and any number of copies obtained therefrom, care being of course observed that the pitch of each record-groove shall correspond with the feed-screw of the phonograph, so that the reproduction may be perfect throughout.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation, on an enlarged scale, of a cylindrical phonographic record embodying my present improvements and showing the formation of two complete record-grooves thereon greatly exaggerated; and Fig. 2, a detail elevation, on the same scale, of a part of this record, illustrating the process of making the same.

In the views corresponding parts are represented by the same numerals and letters of reference.

The duplex records are formed on a blank 1, which is of the usual recording material. This blank is somewhat longer than those ordinarily employed, so as to provide a clear space at the left of the line X X on which the proper adjustment may be secured. The recorder 2 is of smaller diameter than those ordinarily used, one of a diameter of .020 of an inch being shown, with which a sufficiently deep record can be formed in a space only one two-hundredths of an inch in width. Obviously by reducing the diameter of the recording-tool the depth of the record may be increased. Preferably the recorder is engaged with the blank 1, which is then rotated to form a smooth groove *a* in a space at the left of the line X X, and when this line is passed the recording-diaphragm will be subjected to the effect of sound-waves to form a complete record-groove *a'* on the blank. Obviously between the record-groove so formed a blank space will be left in which one or more record-grooves may be cut. After the record-groove *a'* has been formed the recorder is again engaged with the blank at the left of the line X X to form a smooth groove *b*. The position of this groove with respect to the groove *a* may be observed under the microscope and the recorder adjusted until the groove *b* is located exactly between the groove *a*, so that when the line X X is passed a com-

plete record-groove *b'* may be cut in the blank. It will be evident that if three or more record-grooves are desired these operations will be correspondingly modified, necessitating, of course, the employment of a smaller recording-tool. After the desired records are formed on the blank the latter is cut off at the line X X and may then be used in a reproducing-machine, or it may be employed as a master from which duplicate copies may be secured by any known process. Records of this sort are capable of use on standard phonographs, it being only necessary to make use of a reproducing-stylus of a sufficiently small diameter. It is desirable that the materials used for making duplex records of this kind should be harder than the materials which are at present employed for this purpose, and I prefer, therefore, to use the original record as a master from which duplicate copies in celluloid or other hard material can be secured. By making the records very hard a small reproducing-stylus can be made use of without undue wear.

While I prefer to form a record-groove in the way described by first cutting one groove in the blank and then adjusting the recorder and then cutting a second record-groove alternately arranged with respect to the first record-groove, it will be understood that two or more diaphragms may be used actuating separate recording-tools, which diaphragms are simultaneously subjected to the different sound-vibrations, whereby all of the record-grooves may be formed simultaneously on the blanks.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. As a new article of manufacture, a sound-record tablet carrying on its surface a continuous sound-record extending around the axis of said tablet a plurality of times and an independent sound-record lying between the windings of said first-named record and extending about the axis of said tablet a plurality of times, substantially as set forth.

2. As a new article of manufacture, a cylindrical sound-record tablet carrying on its surface a continuous sound-record extending around the axis of said tablet a plurality of times and an independent sound-record lying between the windings of said first-named rec-

ord and extending about the axis of said tablet a plurality of times, substantially as set forth.

3. As a new article of manufacture, a sound-record having an extended portion carrying a plurality of continuous alternately-arranged grooves and on its main portion, a continuous extension of such grooves, alternately arranged representative of sound-vibrations, substantially as set forth.

4. The process of making duplex sound-records which consists in cutting in the face of a blank tablet a continuous sound-record groove extending around the axis of said tablet a plurality of times, and an independent sound-record groove between the windings of said first-named record-groove and extending about the axis of said tablet a plurality of times, substantially as set forth.

5. The process of making duplex sound-records which consists in cutting in the face of a blank cylindrical tablet a continuous sound-record groove extending around the axis of said tablet a plurality of times, and an independent sound-record groove extending about the axis of said tablet a plurality of times, substantially as set forth.

6. The process of making duplex sound-records, which consists in cutting a sound-record groove on a blank cylinder with a space between the groove, and in then cutting one or more continuous sound-record grooves on the space presented between the first groove, substantially as set forth.

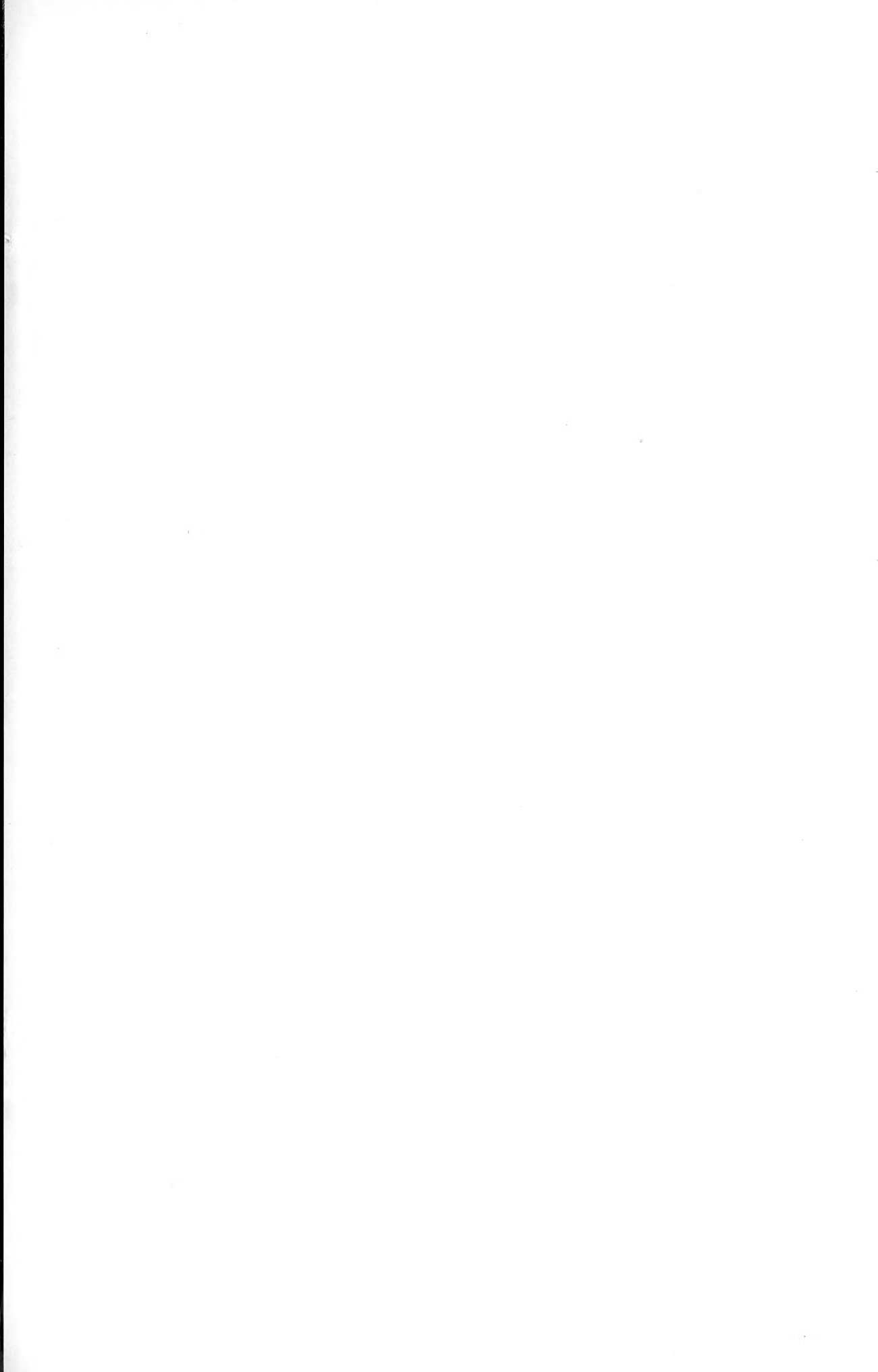
7. The process of making duplex sound-records, which consists in cutting a smooth groove on a blank cylinder, and in then subjecting the cutting-stylus to the action of sound-waves to cut a sound-record on the cylinder as a continuation of the smooth groove, then in adjusting the recorder to cut a smooth groove on the blank in the space presented between the first smooth groove, and finally in subjecting the recorder to sound-vibrations to cut a second sound-record on the blank in the space presented between the first record-groove, substantially as set forth.

This specification signed and witnessed this 24th day of June, 1904.

THOS. A. EDISON.

Witnesses:

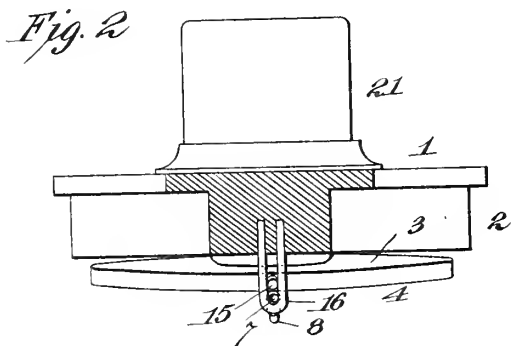
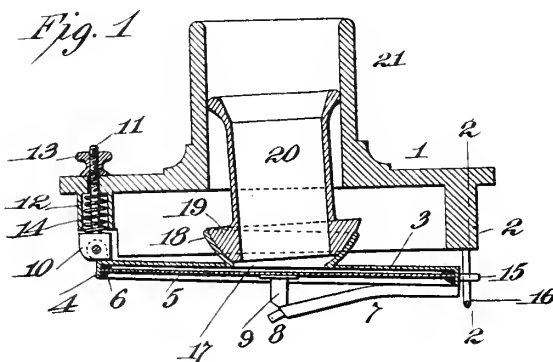
FRANK L. DYER,
ANNA R. KLEHM.



No. 800,890.

PATENTED OCT. 3, 1905.

P. WEBER.
PHONOGRAPHIC RECORDER.
APPLICATION FILED FEB. 6, 1901.



Witnesses:

Jas. F. Coleman
Jno. R. Taylor

Inventor

Peter Weber
by *Ayer Edmund & Ayer*

Att'ys.

UNITED STATES PATENT OFFICE

PETER WEBER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPHIC RECORDER.

No. 800,890.

Specification of Letters Patent.

Patented Oct. 3, 1905.

Application filed February 6, 1901. Serial No. 46,169.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographic Recorders, (Case B,) of which the following is a description.

My invention relates to various new and useful improvements in phonographic recorders; and my object generally is to simplify the construction and improve the operation of such devices.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a vertical sectional view of one form of the device, and Fig. 2 a section on line 2 2 of Fig. 1.

In the above views corresponding parts are represented by the same numerals of reference.

Referring to Figs. 1 and 2, the body 1 of the recorder may either be a plain disk or be hollowed out interiorly to form a flange 2 for the purpose of lightness.

3 represents the compensating weight, which in the present instance also performs the function of a diaphragm-carrier, and to this end the weight 3 is in the form of a disk, having a peripheral flange 4 and receiving a diaphragm 5, held in place in any suitable way by means of cement 6. Secured to the flange 4 at one side is a light, preferably aluminium, arm 7, carrying the recording device 8 at one end and connected centrally to the diaphragm by a link 9, cemented or otherwise secured in place. The compensating weight 3 is pivoted at one side to a pivot-block, comprising a head 10 and a shank 11, which extends up through a chamber 12 in the flange 2 and receives above the disk 1 an adjusting-screw 13 for adjusting the compensating weight with respect to the phonogram-blank. A spring 14 in the chamber 12 normally exerts a downward stress on the head 10. At its other end the compensating weight is provided with a finger 15, working between guides 16, so that that end of the weight can vibrate vertically, but will be locked against lateral movements. The compensating weight 3 is provided at its center with an orifice 17, sur-

rounding which is a socket 18 for receiving the spherical head 19 of a tube 20, which is adjustably movable within the usual neck 21, to which the speaking-tube is connected. The head 19 is larger than the bore of the neck 21, so that it cannot be withdrawn there-through.

The operation of devices embodying my present improvements will be readily understood. The mass of the compensating weight causes the recording device to engage to the proper depth in the composition of the blank. Any eccentricities or variations in diameter of the blank will result in the compensating weight, diaphragm, and recording device being moved vertically up or down. The compensating weight will not, however, respond to the rapid vibrations of the recording device under the effect of the sound-waves; but so far as such vibrations are concerned it remains inert, as is now the case with devices of this type wherein such compensating weights are employed.

While I prefer to use my present improvements in connection with a phonographic recording device, it will be understood that the recording-tool 8 can be removed and a reproducer substituted therefor, and therefore in the succeeding claims I shall refer to a recording or reproducing tool generally as a "stylus."

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a device of the class described, the combination with a body having an ascending neck, of a disk pivotally connected to said body and situated below said body, said disk being formed with a central opening, a rounded socket surrounding said opening, a diaphragm carried by said disk, a stylus connected to said diaphragm and a tube having a lower end rounded to fit said socket, said tube resting on and supported by said socket with its upper end extending into said neck, substantially as set forth.

2. In a device of the class described, the combination of a body having a depending flange and an ascending neck, of a disk pivoted to said body with a universal joint, a diaphragm carried by said disk, a stylus connected to said diaphragm and a tube leading from the disk into the space inclosed by said neck,

and means for vertically adjusting said universal joint, substantially as set forth.

3. In a device of the class described, the combination of a body having a depending flange and an ascending neck, of a disk pivoted to said body with a universal joint, a diaphragm carried by said disk, a stylus connected to said diaphragm and a tube leading from the disk into the space inclosed by said neck, a nut for elevating such universal joint and a spring for depressing the same, whereby vertical adjustment thereof may be effected, substantially as set forth.

4. In a device of the class described, a diaphragm-support consisting of a disk having a peripheral flange, a central aperture and a socket surrounding said aperture, in combination with a diaphragm secured to said support within the said flange, substantially as set forth.

5. In a device of the character described, the combination with a body having an ascending neck, and a diaphragm-support pivoted to said body, said support having a central aperture and a rounded socket surrounding said aperture, of a tube whose upper end extends into said neck and whose lower end engages said socket, said lower end being greater in diameter than the bore of said neck, whereby the tube is secured against withdrawal, substantially as set forth.

6. In a device of the character described,

the combination with a body having an ascending neck, and a diaphragm-support pivoted to said body, said support having a central aperture and a rounded socket surrounding said aperture, of a tube whose upper end extends into said neck and whose lower end engages said socket and means for preventing the withdrawal of said tube through said neck, substantially as set forth.

7. In a device of the character described, the combination with a body having an ascending neck, and a diaphragm-support pivoted to said body, said support having a central aperture and a rounded socket surrounding said aperture, of a tube whose upper end extends into said neck, and whose lower end is provided with a bearing-surface rounded on substantially the same curve as said socket and engages the same, substantially as set forth.

8. In a device of the character described, the combination of a body, a vertically-adjustable pivot-block carried thereby, a diaphragm-support pivoted to said pivot-block on a horizontal axis and a diaphragm carried by said support, substantially as set forth.

This specification signed and witnessed this 30th day of January, 1901.

PETER WEBER.

Witnesses:

HARRY F. MILLER,
J. H. MORAN.



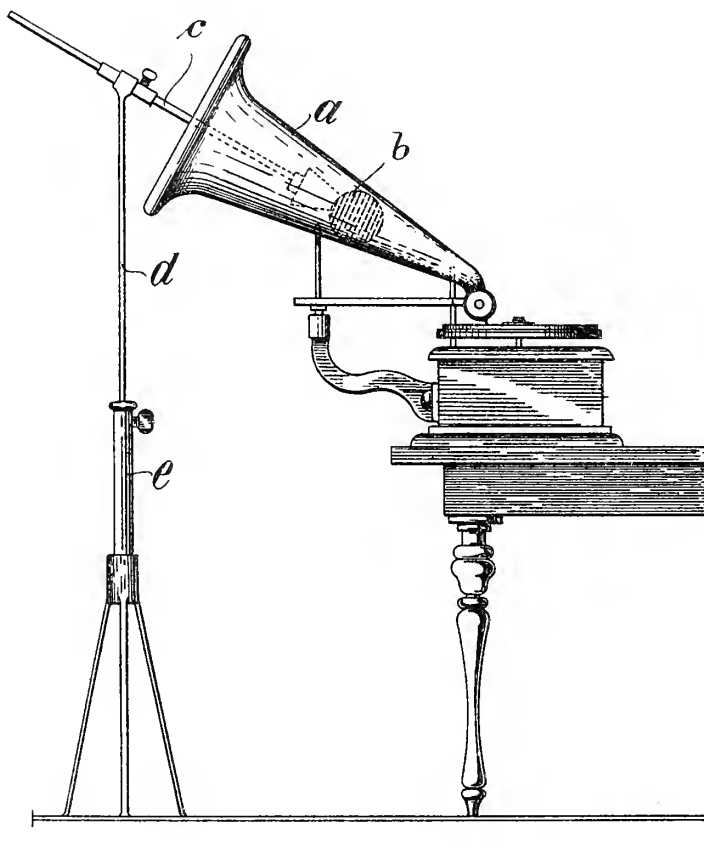
No. 800,987.

PATENTED OCT. 3, 1905.

A. CONZE.

SOUND REGULATOR FOR GRAMOPHONES, PHONOGRAPHS, AND LIKE INSTRUMENTS.

APPLICATION FILED MAR. 21, 1905.



Witnesses
Chas. A. Smith
Richard Lee

Inventor
Albert Conze
Per Harold Terrell
cut

UNITED STATES PATENT OFFICE.

ALBERT CONZE, OF BERLIN, GERMANY.

SOUND-REGULATOR FOR GRAMOPHONES, PHONOGRAPHS, AND LIKE INSTRUMENTS.

No. 800,987.

Specification of Letters Patent.

Patented Oct. 3, 1905.

Application filed March 21, 1905. Serial No. 251,184.

To all whom it may concern:

Be it known that I, ALBERT CONZE, a subject of the King of Prussia, German Emperor, residing in Berlin, Germany, have invented an Improvement in Sound-Regulators for Gramophones, Phonographs, and Like Instruments, of which the following is a specification.

Heretofore the rendering of selections of instrumental or vocal music by gramophones, phonographs, and like instruments has been accompanied by peculiar incidental screeching sounds, as well as the disagreeable scratching noise made by the point of the reproducer; and the object of my invention is the elimination of these unseemly sounds and noises as far as this is possible.

In carrying out my invention I employ a regulator or muffler placed in the horn or megaphone of the gramophone or phonograph, means for adjusting the regulator to any desired position within the horn, and means for supporting and maintaining the regulator in any adjusted position, all of which will be hereinafter more specifically set forth.

The drawing represents an elevation of a gramophone, the horn of which is fitted with my improved regulator.

Referring to the drawing, *a* designates the horn or megaphone of a gramophone or similar instrument. Within the horn *a* I employ a regulator or muffler *b*, preferably a sphere or spherical in form and made of felt, leather, cork, or other suitable material. The regulator *b* is secured by any suitable connection to one end of a rod *c*, extending beyond the mouth of the horn and through a suitable bearing fixed in the upper end of a support-rod *d*, mounted adjustably in the tripod or other holder *e*. The rod *c* is adjustable in the bearing through which it passes and may be maintained in any adjusted position by means of a set-screw or otherwise, as may be found expedient.

The relative position of parts hereinbefore described is such that in adjusting the regulator *b* the movements of the rod *c* are in the central longitudinal line or axis of the horn *a*, so that in all positions, except when the regulator may accidentally be in contact with the interior walls of the horn, there will be an

annular space of varying degree between the exterior of the regulator and the interior walls of the horn, and it will be manifest that, depending upon the distance of the regulator from the walls of the horn, a greater or lesser muffling of the sound will be effected with a correspondingly greater or lesser elimination of the disagreeable sounds aforesaid.

The volume of sound produced by different records varies, some being moderate in extent and some very loud and harsh, and this condition will require the adjustment of the regulator *b* to deliver an acceptable and modulated tone, the regulator being differently positioned for different records for rendering tones of substantially corresponding volume.

I do not limit myself to the precise form of the regulator *b* or to the materials of which the same is made or the manner of making, as the same may be varied without departing from my invention.

I claim as my invention—

1. In a gramophone and like instruments and in combination with the horn thereof, a regulator placed within the said horn, means for adjusting said regulator to any desired position within the horn, and means exterior to the horn for supporting and maintaining said regulator in any adjusted position.

2. In a gramophone and like instruments and in combination with the horn thereof, a spherical regulator within said horn, a rod to one end of which the regulator is secured, a bearing in which the rod is movable longitudinally of the horn, means for holding the rod in any position in said bearing, and a support for said bearing.

3. In a gramophone and like instruments and in combination with the horn thereof, a spherical regulator within said horn, a rod to one end of which the regulator is secured, a bearing in which the rod is movable longitudinally of the horn, means for holding the rod in any position in said bearing, and a vertically-adjustable tripod-support carrying said bearing at its upper end.

Signed by me this 3d day of March, 1905.

ALBERT CONZE.

Witnesses:

JOHANNES HEIN,
WOLDEMAR HAUPT.





No. 801,634.

PATENTED OCT. 10, 1905.

W. ASAM.
PHONOGRAPH.

APPLICATION FILED MAR. 17, 1903.

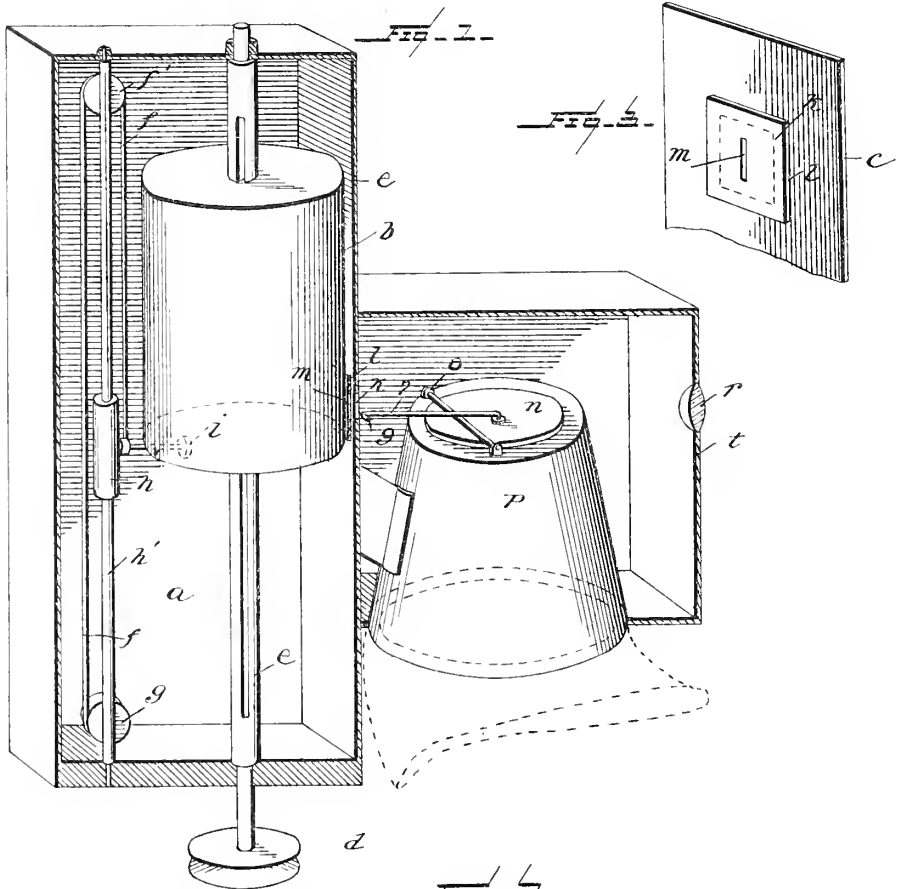


FIG. 1

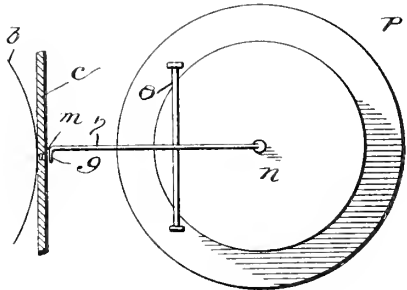
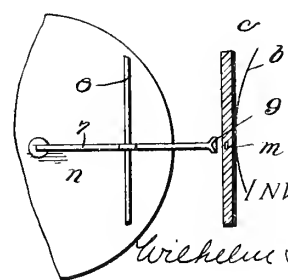


FIG. 2

FIG. 3



WITNESSES:
H. F. Koye
E. O. Niederbrand

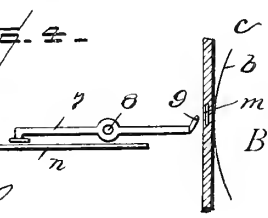


FIG. 4

INVENTOR:
Wilhelm Asam
 BY *Georgii Masses*
 Attorneys

UNITED STATES PATENT OFFICE.

WILHELM ASAM, OF MURNAU, GERMANY.

PHONOGRAPH.

No. 801,634.

Specification of Letters Patent.

Patented Oct. 10, 1905.

Application filed March 17, 1903. Serial No. 148,201.

To all whom it may concern:

Be it known that I, WILHELM ASAM, residing at Murnau, Bavaria, Germany, have invented certain new and useful Improvements in Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the registering and reproduction of sounds, and has for its object the reproduction of softer tones—such, for instance, as the human voice in ordinary conversation—or to faithfully register the sounds of a softer-toned instrument playing in an orchestra.

In connection with the reproduction of sounds as hitherto usually accomplished the sensitiveness and accuracy of the reproducing instrument, and consequently the faithfulness of reproduction, are impaired by the fact that the pin or stylus connected with the vibrating membrane is charged with the work of transferring the vibrations to a blackened plate or of impressing them in a soft mass. In order to insure the requisite delicacy of operation necessary to the faithful reproduction of the softer tones, the membrane must be relieved of the work of itself performing the indentations. This object may be attained by the aid of photography; but in the attempt to do so it is essential, first, that the vibrations be obtained in the form of the very finest lines, and, second, that these lines be then converted into impressions in a suitable mass by means of a further process, such as photographic bas-relief and photogravure. The photographing of sound-waves for this purpose has been heretofore attempted with greater or less success; but the methods employed have usually been open to the objection that the resultant lines are not of a sufficient degree of fineness and delicacy to constitute a satisfactory graphic representation of sound-waves.

Generally speaking, the present invention is based upon the fact that if a very fine and light lever is mounted with one end connected to the vibrating membrane and its other end disposed in front of a very thin slot in a stationary wall behind which a light-sensitive film is moved that portion of the sensitive film lying in the shadow of the vibrating lever will represent in the form of a white negative line the exact expression of the vibration of the membrane. Since in this case the direct rays

of light come into play and the lever and slot are made as fine as is possible, the fineness of the phonogram is correspondingly accurate in the finest details. As a support to the light-sensitive film a drum or disk is advantageously used, to which is imparted a rotary movement and simultaneously a progressive axial movement, whereby the white sensitive line upon the surface of the film is in the form of a continuous spiral of sound-waves. The employment of a disk facilitates the subsequent conversion of the photographed lines into the depressed sound-lines of the phonograph or gramophone disk. The fact, however, that the speed of the disk must be accommodated to the decreased circumference near the center of the disk renders it difficult to utilize all of the space thereon, and consequently the use of a drum as a support is preferred, since the spirals on the drum are of the same size, and consequently a uniform speed of rotation may be maintained.

In order that the invention may be readily understood, reference is made to the accompanying drawings, in which is shown fragmentarily an embodiment of the invention which is specially adapted for the accurate reproduction of sound-waves from the membrane of the speaking apparatus by means of photography.

In the drawings, Figure 1 is a perspective sectional view of one embodiment of the invention. Fig. 2 is a top plan of the diaphragm and lever. Fig. 3 is a detail showing the arrangement of the light-apertures. Fig. 4 is a side view of a modification, and Fig. 5 is a top plan of Fig. 3.

In the form of apparatus shown in Figs. 1 and 2 a rotary drum or disk provided with a light-sensitive surface b is caused to rotate in a light-tight case a and as close as possible to one wall c of said case. By means of a pulley d or other suitable well-known mechanism an even rotary movement is given to the drum or disk about its axis. The drum is also simultaneously moved in a direction longitudinally of the shaft e , which is grooved, as shown, by the unwinding of a chain f from the spool g , the said chain being guided over a top guide-roller f' and attached to a slide-block h , adapted to slide on a guide-rod h' . The said block h carries an arm with a roll i , which extends under and carries the weight of the roll or drum b . Thus as the block descends the drum b will be gradually lowered. Any suitable

mechanism may be employed for driving the pulley *d* and for operating the chain *f*. The driving mechanism should be regulated to impart to the drum between seventy and one hundred revolutions per minute. At the point where the drum is nearest to the wall *c* the latter is provided with a rectangular opening *k*. (Shown in dotted lines in Fig. 3.) Inside the case this opening is covered by a light-proof plate *l*, having a very fine slot *m*. By a suitable arrangement of micrometer-screws this slot may be adjusted with great accuracy and fineness. A light lever 7 is pivoted at 8 adjacent to the speaking apparatus and in such relation thereto that one of its arms rests loosely upon the membrane *n* upon the sound-bell *p*, while the other end of the lever is bent horizontally, being formed as a fine wire 9. The relation of the end of the lever to the case is such that the wire 9 extends directly across the narrow slot *m*.

The membrane must be very sensitive and may be of any desired material. It is advantageously made of the finest india-rubber or of an organic skin, such as fish-bladder. The lever carrying the wire 9 is very accurately balanced on the membrane and may be connected to the same by means of a drop of wax. Instead of a membrane the receiving-surface of a telephone may be provided with the lever and the sound-waves might be photographed in this manner.

As the membrane vibrates under the influence of sound-waves its movement is transmitted by means of the lever to the wire 9, the shadow of which falls upon the light-sensitive surface *b* and leaves a negative impression, as a spiral wavy line, upon the sensitive surface, which corresponds faithfully with the vibrations of the membrane.

Instead of arranging the wire 9 as shown in Figs. 1 and 2 the end of the lever may be upturned and forked, as shown in Figs. 4 and 5, and the wire 9 arranged to extend between the two forks of the lever to serve the purpose of wire 9, as shown in Figs. 1 and 2, the manner of operation and the result in either case being the same.

The source of light should be intense and of small area—such, for instance, as a lime-light or an electric-arc light, if direct sunlight is not available—and may be admitted through a lens *v*, advantageously mounted in the wall *t* of a casing adjoining the case *a* and containing the sound-bell and lever.

I claim as my invention—

1. In an apparatus for reproducing sound-waves, the combination, with a sensitized surface, and an inclosure therefor provided with a light-admitting aperture movable relative to the sensitized surface, of a sound-recording membrane or diaphragm, and means connected with the diaphragm for intercepting the rays of light passing through said aperture oppo-

site the point where the record is to be reproduced.

2. In an apparatus for reproducing sound-waves, the combination, with a sensitized surface, means for rotating the same, and an inclosure therefor provided with a light-admitting aperture, of a sound-recording diaphragm, and means connected with the diaphragm for intercepting that portion of the rays of light passing through said aperture opposite the point where the record is to be reproduced.

3. In an apparatus for reproducing sound-waves, the combination, with a sensitized surface, means for imparting to the said surface a rotary and longitudinal movement, and an inclosure for said surface provided with a light-admitting aperture, of a sound-recording diaphragm, and a lever pivoted in such relation thereto that one arm will rest upon the diaphragm and move therewith and the other end will intercept that portion of the light-rays passing through said aperture opposite the point where the record is to be reproduced.

4. In an apparatus for reproducing sound-waves, the combination, with a cylindrical sensitized surface, means for imparting to said surface a rotary movement and a movement longitudinally of its axis, and an inclosure for said sensitive surface provided with a narrow light-admitting slot, of a sound-recording diaphragm, and a lever pivoted adjacent to the diaphragm with one end resting thereon and the other end extending across the slot in such manner as to intercept a portion of the light-rays passing therethrough opposite the point where the record is to be reproduced.

5. In an apparatus for reproducing sound-waves, the combination, with a cylindrical sensitized surface, means for imparting to said surface a rotary movement and a movement longitudinally of its axis, and an inclosure for said sensitive surface provided with a narrow longitudinal light-admitting slot, of a sound-recording diaphragm, a lever pivoted adjacent to the diaphragm with one arm resting thereon and the other end extending perpendicularly to the sensitive surface and terminating in a fine filament extending across the slot in such manner as to intercept that portion of the light-rays passing therethrough opposite the point where the record is to be reproduced.

6. The method of reproducing sound-waves, which consists in transferring the same by means of photography from a vibrating diaphragm to a sensitive surface in the form of a negative line.

7. The method of reproducing sound-waves, which consists in transferring the same by means of photography from a vibrating diaphragm to a sensitive surface in the form of an unexposed line corresponding to the vibrations of the diaphragm and bounded on both sides by an exposed area.

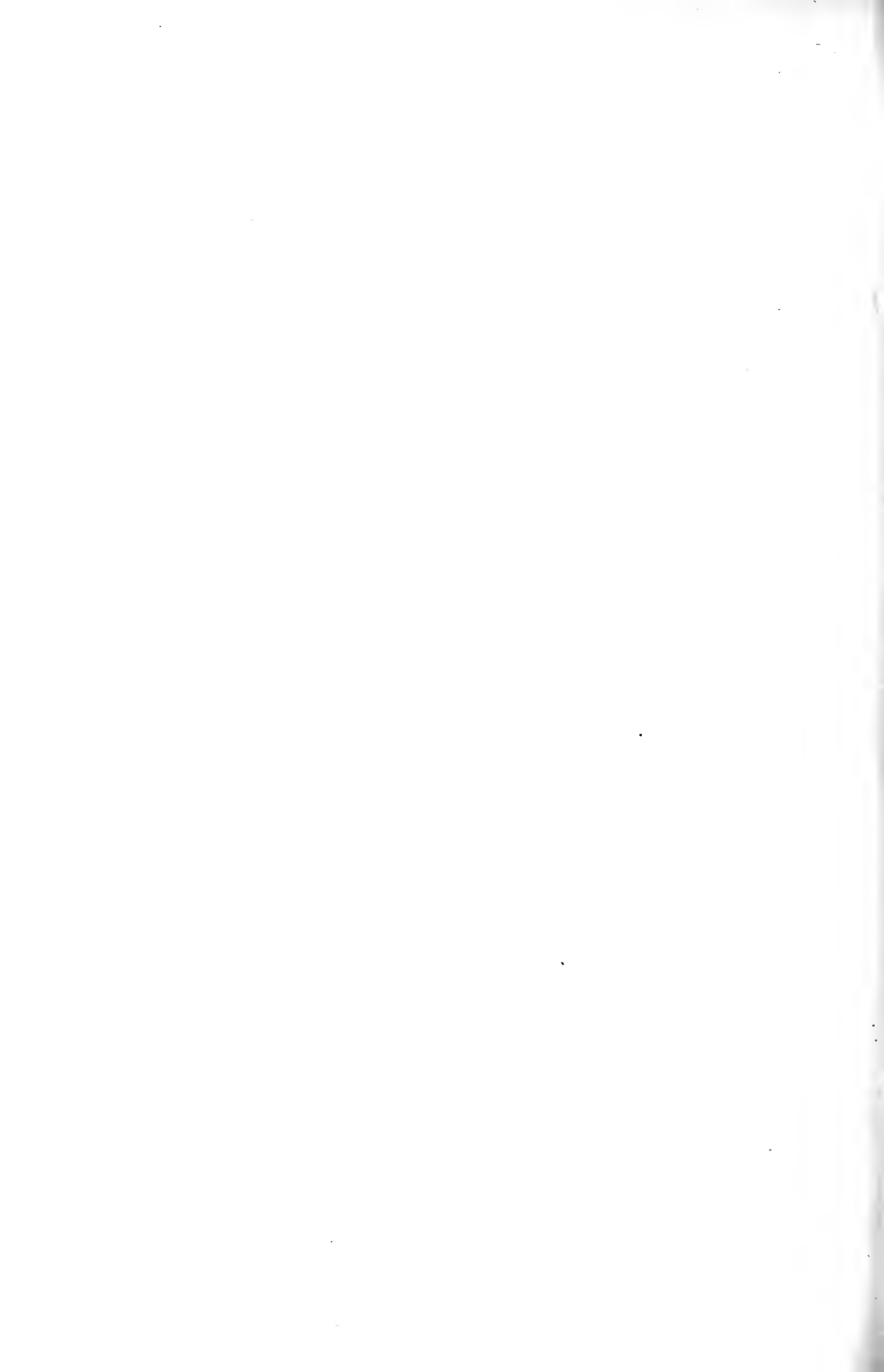
8. The method of reproducing sound-waves,
which consists in transferring the same by
means of photography from a vibrating dia-
phragm to a sensitive surface in the form of
5 a spiral wavy unexposed line corresponding
to the vibrations of the diaphragm and bound-
ed on each side by an exposed area.

In testimony whereof I affix my signature in
presence of two witnesses.

WILHELM ASAM.

Witnesses:

CLARA I. PARKER,
WALTER E. BOWMAN.





R. L. GIBSON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JAN. 13, 1905.

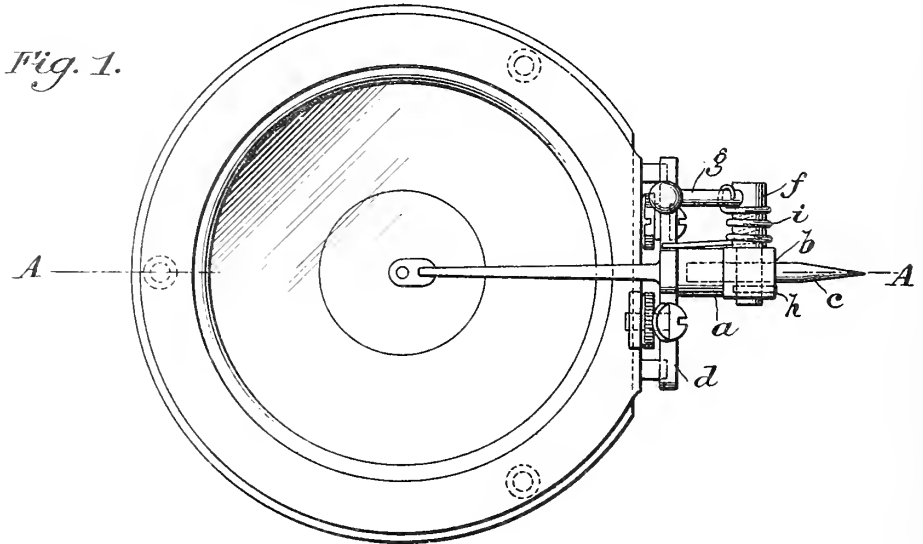


Fig. 2.

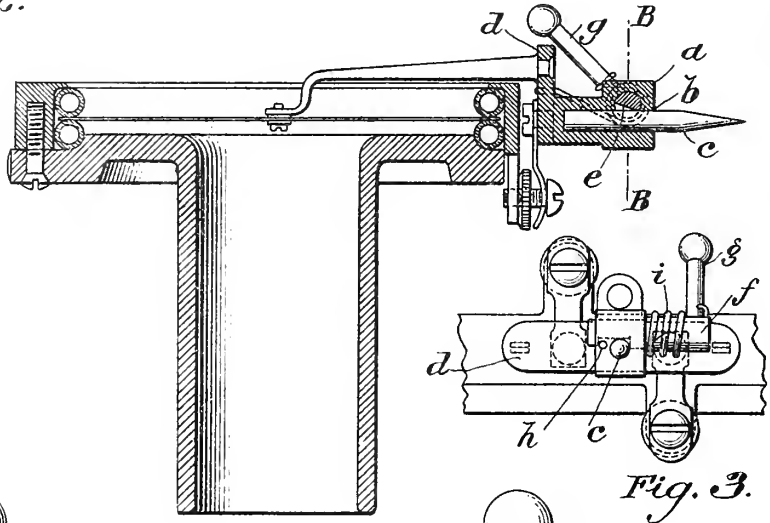
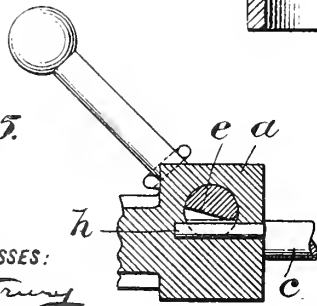


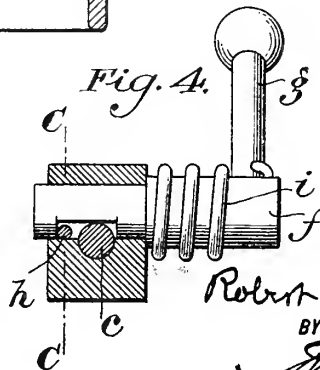
Fig. 3.

Fig. 5.



WITNESSES:
Handwritten signatures: Hans Dring, M. J. Eyer.

Fig. 4.



INVENTOR
Robert L. Gibson

BY
Andrew B. Gramly
 ATTORNEY.

UNITED STATES PATENT OFFICE.

ROBERT LAW GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

No. 801,979.

Specification of Letters Patent.

Patented Oct. 17, 1905.

Application filed January 13, 1905. Serial No. 240,852.

To all whom it may concern:

Be it known that I, ROBERT LAW GIBSON, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Sound-Boxes for Talking-Machines, of which the following is a specification.

My invention has reference to sound-boxes for talking-machines; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

Heretofore it has been customary to provide the stylus lever or bar of a sound-box of a talking-machine, such as a gramophone, with a socket to receive a stylus or needle point, and to clamp the stylus by a set-screw having a milled head with which to turn it. The objection to this has been that it is difficult to operate the screw because of its small size and location, the milled head cuts and abrades the finger and thumb, causing them to become sore, the clamping of the stylus is slow and uncertain, and there is constant liability of losing the screw, as by constant use it becomes worn and loose.

It is the object of my present invention to provide a suitable cam-clamp for the stylus-lever which shall overcome the above-specified objections.

My invention in its preferred form comprehends the provision of the socket end of the stylus-lever with a transverse rotary or rocking cam-shaft, terminating in an operating-arm by which it may be rocked. It further consists of a spring acting to rotate the cam-shaft for normally forcing it into clamping position upon the stylus or needle.

My invention also embodies details of construction which, together with the features specified above, will be better understood by reference to the drawings, in which—

Figure 1 is a plan view of a sound-box provided with my stylus-clamp. Fig. 2 is a transverse sectional view on the line A A of Fig. 1. Fig. 3 is a side elevation of part of the sound-box, showing the stylus-clamp. Fig. 4 is a cross-section, enlarged, on the line B B of Fig. 2; and Fig. 5 is a section on the line C C of Fig. 4 looking to the right.

a is the socket-head on the stylus-bar *d* and is provided with the usual socket *b* for the stylus or needle *c*.

f is a rocking shaft journaled in the head *a* transversely to the socket and near the outer end. This shaft is provided with a cam or

clamping portion *e* adjacent to the socket, which when the shaft is turned slightly in one direction will be moved with the socket. The shaft projects beyond the head *a* at one end and is provided with a finger-piece *g*, by which the shaft may be rocked. A spring *i* holds the shaft normally in clamping position—*i. e.*, with the flattened or cam portion *e* projecting into the socket. A small pin *h* extends longitudinally in the head below the cam portion *e* on one side of the socket and acts as a stop to limit the movement of the shaft under the action of the spring when there is no stylus or needle in the socket.

A needle may be inserted by pressing upon the arm *g* with the thumb of one hand, and thereby rocking the shaft *f* to move the cam portion *e* out of the socket, then inserting the needle with the fingers of the other hand, and finally releasing the piece *g*. The spring *i* will then rock the shaft back and cause the cam portion *e* to press upon the shank of the needle and clamp it firmly in the socket.

To prevent wearing away of the cam portion, its edge may be slightly rounded. The needle will be released by simply pressing back the piece *g* to open the clamping-jaw or cam portion *e*. If no needle is inserted, the jaw or cam portion will be arrested by the pin *h*.

I prefer to arrange the clamping-shaft near the outer end of the head *a*, so that the needle will be clamped near the point.

The essential feature of my invention in its specific form is the rotary or rocking cam-shaft to clamp the stylus or needle point when combined with a spring to move it into clamping position; but I do not confine myself to any specific form of cam-clamp for the stylus, as it will be apparent to those skilled in the art that an adjustable cam-clamp adapted for the purpose of and capable of performing the functions of my invention may be made in many ways as modifications of my invention. Therefore, while I prefer the construction shown as being excellently adapted for the requirements of my invention, I do not limit myself to the details thereof.

What I claim as new, and desire to secure by Letters Patent, is—

1. A sound-box for a talking-machine having its stylus-lever provided with an aperture for receiving the stylus and combined with a rotary cam-clamp for holding the stylus in the stylus-lever consisting of a transverse cylindrical shaft having a portion of its body inter-

mediate of its ends cut away to form a substantially flat cam-surface to grip the stylus.

2. A sound-box for a talking-machine having its stylus-lever provided with an aperture
5 for receiving the stylus and combined with a spring-actuated rotary cam-clamp for holding the stylus in the stylus-lever consisting of a transverse cylindrical shaft having a portion of its body intermediate of its ends cut away
10 to form a substantially flat cam-surface to grip the stylus.

3. A sound-box for a talking-machine having its stylus-lever provided with an aperture for receiving the stylus and combined with a
15 rotary cam-clamp arranged transversely to one side of the aperture in the stylus-lever for holding the stylus in the stylus-lever consisting of a transverse cam-shaft journaled in the stylus-lever and means to impart a rotary
20 motion to the shaft projecting outwardly away from the plane of the diaphragm and stylus-lever.

4. A sound-box for a talking-machine having its stylus-lever provided with an aperture
25 for receiving the stylus and combined with a rotary cam-clamp for holding the stylus in the stylus-lever consisting of a rotary cam-shaft journaled in the stylus-lever and having an extended handle, and a spring to rotate said shaft
30 normally into gripping position.

5. A sound-box for a talking-machine having its stylus-lever provided with an aperture for receiving the stylus and combined with a
35 rotary cam-clamp for holding the stylus in the stylus-lever consisting of a rotary cam-shaft journaled in the stylus-lever and having an extended handle, a stop to limit the extent of rotation of the shaft, and a spring to normally rotate said shaft into gripping position.

40 6. In a sound-box for talking-machines, a stylus-lever having a socket for receiving the stylus combined with an adjustable transverse shaft journaled in the stylus-lever and flattened to form a cam-clamp for clamping the
45 stylus in the socket and having at one end a laterally-extending arm by which to rock it.

7. In a sound-box for talking-machines, a stylus-lever having a socket for receiving the stylus, combined with a transverse rocking cam-shaft of small diameter whereby the axis
50 of the shaft is in close alinement with the clamping edge of the cam-shaft so as to impart a strong gripping action upon the stylus, a spring constantly acting to rotate the cam-shaft to grip the stylus, and an outwardly-extending
55 arm to rock the shaft against the action of the spring to release the stylus.

8. In a sound-box for talking-machines, a stylus-lever having a socket for receiving the stylus combined with an adjustable cam-clamp
60 for clamping the stylus in the socket consisting of a transverse shaft *f* having the flattened portion *e* journaled in the end of the stylus-lever across the socket and provided with a projecting portion to rock said shaft.
65

9. In a sound-box for talking-machines, a stylus-lever having a socket for receiving the stylus combined with an adjustable cam-clamp for clamping the stylus in the socket consisting
70 of a transverse shaft *f* having the flattened portion *e* journaled in the end of the stylus-lever across the socket and provided with a projecting portion to rock said shaft, and a pin *h* to hold the shaft in position against longitudinal movement and limit its rocking or
75 rotary movement.

10. In a sound-box for talking-machines, a stylus-lever having a socket for receiving the stylus combined with an adjustable cam-clamp
80 for clamping the stylus in the socket consisting of a transverse shaft *f* having the flattened portion *e* journaled in the end of the stylus-lever across the socket and provided with a projecting portion to rock said shaft, a stop to limit the rocking of the shaft, and a spring
85 to rock the shaft into clamping position.

In testimony of which invention I hereunto set my hand.

ROBERT LAW GIBSON.

Witnesses:

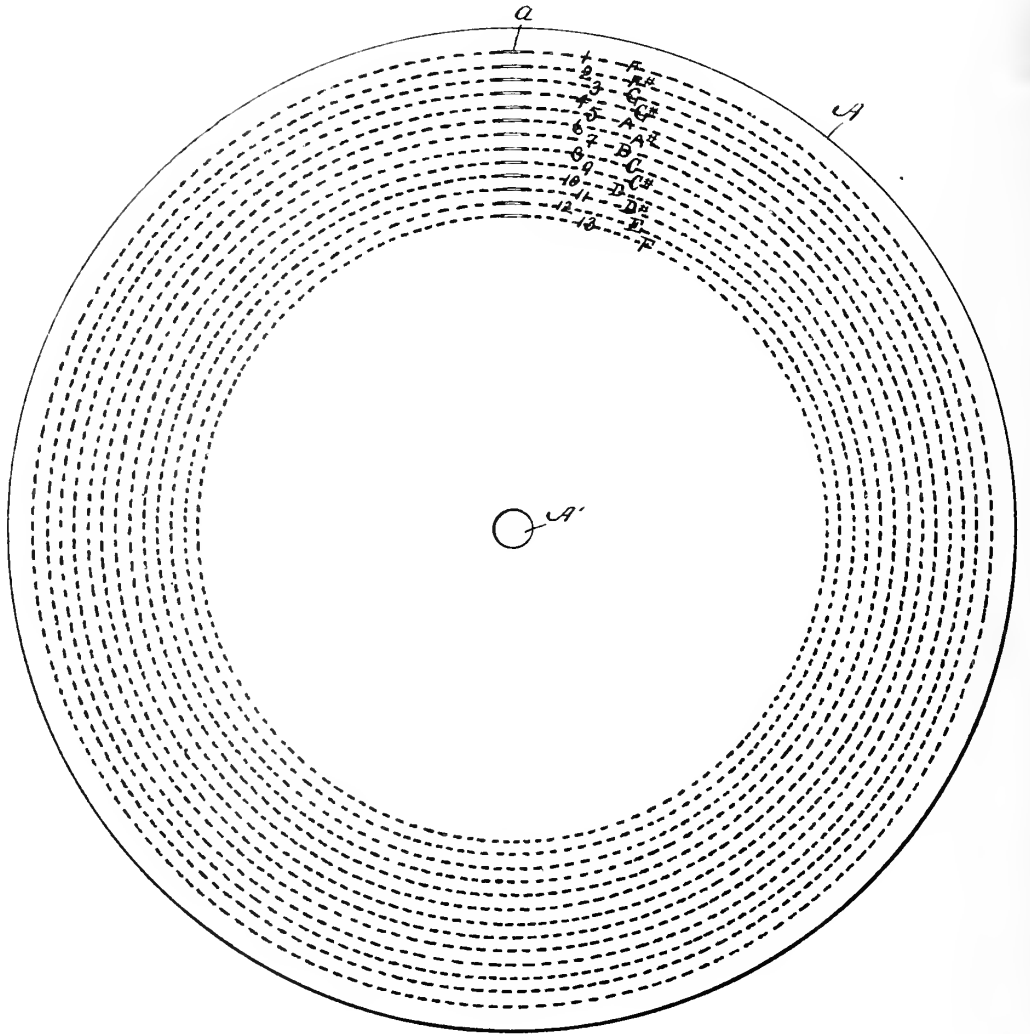
ERNEST HOWARD HUNTER,
R. M. KELLY.



No. 802,135.

PATENTED OCT. 17, 1905.

N. BRYANT.
PHONOGRAPHIC RECORD.
APPLICATION FILED JAN 30, 1905



Witnesses:

Robert A. Miller
H. B. Margason

Inventor,

Niles Bryant
By *Chappell & Earl*
Att'y's

UNITED STATES PATENT OFFICE.

NILES BRYANT, OF BATTLECREEK, MICHIGAN.

PHONOGRAPHIC RECORD.

No. 802,135.

Specification of Letters Patent.

Patented Oct. 17, 1905.

Application filed January 30, 1905. Serial No. 243,323.

To all whom it may concern:

Be it known that I, NILES BRYANT, a citizen of the United States, residing in the city of Battlecreek, county of Calhoun, State of Michigan, have invented certain new and useful Improvements in Phonographic Records, of which the following is a specification.

This invention relates to improvements in phonographic records.

My improved phonographic record is particularly adapted for the use of piano-tuners or tuners of musical instruments, although it is desirable for use in other relations.

The main object of this invention is to provide an improved phonographic record by the use of which a tone may be sustained for any desired period.

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. The invention is clearly defined, and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawing, which is a plan view thereof.

Referring to the drawing, my improved phonographic record is illustrated in the form of a disk A. The disk is provided with a central opening A' to receive the shaft or arbor of the machine on which it is to be used. A phonographic record is made on this disk, consisting of a series of concentric tone-circles or circles of indentations or undulations produced phonographically, each circle being made by a single or sustained tone. In the record I have illustrated there are thirteen of these tone-circles, representing what is known to musicians as the "equal temperament"—that is, thirteen notes within the scope of one octave. Piano-tuners usually lay the temperament within the octave F, in the middle of the keyboard, beginning with the note called "middle C," which is first tuned to a tuning-fork or a pitch-pipe. F below middle C is then tuned, not to a perfect fifth, but slightly sharp, until there result three beats in five seconds. Next, the fourth below middle C, which is G, is tuned slightly flat until there results one beat per second. All the fourths and fifths must be toned likewise, slightly flat or imperfect. By so doing the result is a perfect octave when the temperament is finished. This is necessary in order to produce harmony in the octaves when com-

pletely tuned. This method of tuning requires a delicate musical sense and the most careful attention and skill. My invention includes the whole temperament so equalized as to give the operator an absolute guide. By placing the phonographic reproducer in the proper tone-circle any tone may be sustained for an indefinite period, so that the user may give his entire attention to the proper adjusting of the instrument which is being tuned.

While I have illustrated a record adapted to produce thirteen tones, as F, F#, G, G#, A, A#, B, C, C#, D, D#, E, and F, this number, it is evident, may be increased as desired; but for the purpose of a guide in tuning instruments it is all that is required.

In order that the tone may be sustained as perfectly as possible and with as slight a break as possible, in making the record the recording device is checked just before it reaches the point at which it was started in the circle, as if it overlapped it would produce an imperfect tone. The ends of the tone-record lines are joined by guiding-grooves, as *a*, for the reproducer-stylus, which grooves are shown considerably exaggerated in this drawing, so that the same may clearly appear.

With my improved record-roll a tone can be produced and sustained at an even pitch as long as may be desired. This is of course of very great advantage in tuning instruments and is of advantage in other relations, as will readily appear.

I have illustrated and described my improved phonographic record in a disk form. It is evident that it is applicable to the well-known form of cylindrical record-rolls, and other modifications will readily appear to those skilled in the art to which the invention relates. I wish to remark that I desire to claim my invention specifically in the form illustrated as well as broadly.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a phonographic-record tuning-disk having a record thereon consisting of a series of thirteen concentric circles of indentations or undulations, each circle constituting a record of a sustained note different from the others, said tones comprising an equal temperament.

2. As a new article of manufacture, a phonographic-record tuning-disk having a record thereon consisting of a series of concentric circles of indentations or undulations, each

circle constituting a record of a sustained note different from the others.

3. As a new article of manufacture, a phonographic tuning-tablet having a record thereon consisting of a series of thirteen lines of indentations or undulations, the ends of each line being joined by a groove, each line constituting a record of a sustained note different from the others, said tones comprising an equal temperament.

4. As a new article of manufacture, a phonographic tuning-tablet having a record thereon consisting of a series of lines of indentations or undulations, the ends of each line being joined by a groove, each line constituting a record of a sustained note different from the others.

5. As a new article of manufacture, a phonographic tuning-tablet having a record thereon consisting of a series of thirteen lines of indentations or undulations, the ends of each line being joined, each line constituting a record of a sustained note different from the others.

ord of a sustained note different from the others, said tones comprising an equal temperament.

6. As a new article of manufacture, a phonographic tuning-tablet having a record thereon consisting of a series of lines of indentations or undulations, the ends of each line being joined, each line constituting a record of a sustained note different from the others.

7. As a new article of manufacture, a phonographic-record tuning-disk, the record of which consists of a line of indentations or undulations constituting a record of a sustained note, the beginning and end of which line are in proximity, whereby the record can be repeated indefinitely.

In witness whereof I have hereunto set my hand and seal in presence of two witnesses.

NILES BRYANT. [L. s.]

Witnesses:

FRED W. ERWIN,
EDWIN F. EDMONDS.

25

30

35

40

C. L. HIBBARD.
PHONOGRAPH RECORDER.
APPLICATION FILED FEB. 15, 1905.

Fig. 2.

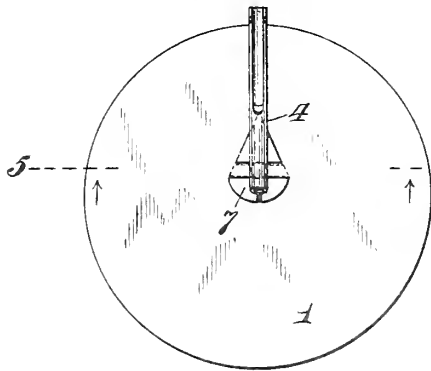


Fig. 3.

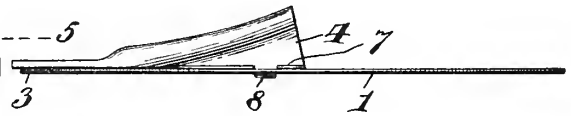


Fig. 5.

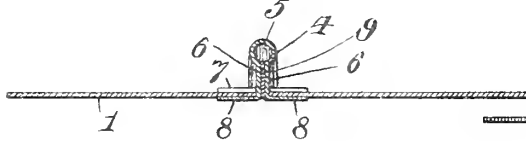


Fig. 4.

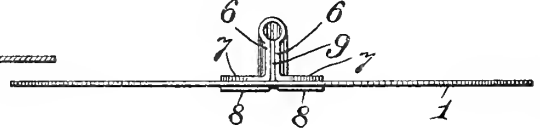
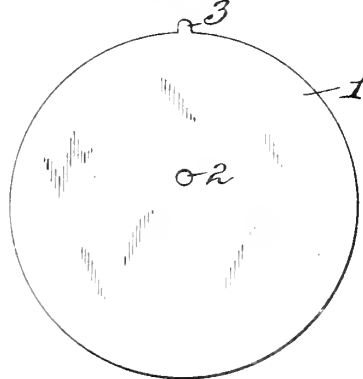


Fig. 1.



Attest:
Edgeworth Greene
De los Holden.

Inventor:
Charles L. Hibbard
by *Frank L. Green*, Atty.

UNITED STATES PATENT OFFICE.

CHARLES L. HIBBARD, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-RECORDER.

No. 802,212.

Specification of Letters Patent.

Patented Oct. 17, 1905.

Application filed February 15, 1905. Serial No. 245,650.

To all whom it may concern:

Be it known that I, CHARLES L. HIBBARD, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Recorders, of which the following is a specification.

My invention relates to recorders which comprise a cutting-stylus, preferably in the form of a small cylinder having a circular cutting edge, which stylus is held in a socket formed usually of light flexible metal, such as aluminium. In recorders of this type as heretofore made the metal socket-piece has been provided with a flat portion, which is secured to the lower surface of the diaphragm by shellac or other adhesive material. This structure is defective, for the reason that the stylus-holder is extremely likely to become detached from the diaphragm, since it occupies an exposed position and is not securely held.

My invention has for its object the provision of a recorder of this type which will be cheap and easy to manufacture and which will be free from the defect pointed out.

Reference is hereby made to the accompanying drawings, in which the same reference-numerals indicate corresponding parts in the several views, of which—

Figure 1 is a plan view of the diaphragm which I prefer to use in the construction of the recorder. Figs. 2, 3, and 4 are plan, side elevation, and front elevation, respectively, of the diaphragm and stylus-holder in their assembled relations. Fig. 5 is a section on the line 5 5 of Fig. 2.

The diaphragm 1 may be of any suitable material, such as glass or mica, circular in form, and provided with a perforation 2. This perforation is preferably situated eccentrically, for the purpose which will appear later. The periphery of the diaphragm is provided with a projection 3, as shown, which is usually in line with the perforation 2 and the center of the disk, as shown in Fig. 1, although not necessarily so. The stylus-holder 4 is formed by bending a thin sheet of a flexible metal, such as aluminium, to form a socket 5, a vertical web of two thicknesses 6 6, and lateral wings 7 7. In practice it is found that owing to the exposed position of

the stylus accidental blows caused by careless handling tend to force the stylus out of the socket 5 and between the two thicknesses 6. In order to prevent this, I unite the said thicknesses by means of a suitable solder 9. The thickness of the solder is greatly exaggerated in Figs. 4 and 5. In practice the webs 6 are pressed closely together, and the solder is sweated in. In order to provide means for securing the stylus-holder to the diaphragm, the webs 7 are slitted, as shown in Fig. 2, to form integral tongues 8, which are passed through the aperture 2 and bent into the positions shown in Figs. 4 and 5. The holder is thus provided with a flat surface on each side of the diaphragm and is firmly clamped thereto. Shellac or other cement applied between both sides of the diaphragm and the holder secures the holder more firmly and prevents any possible lateral movement.

When in its operative position, the holder is preferably situated so that the cutting edge of the stylus will be in line with the axis of the diaphragm. For this reason the perforation 2 is eccentric thereto, the degree of eccentricity depending upon the location of the securing-tongues 8. In order that the stylus-holder may be readily placed in such position as to bring the stylus in line with the center of the disk, the projection 3 is provided as a gage or alining-stop. Preferably this projection is in line with the center of the diaphragm and the perforation 2, so that after the tongues 8 of the diaphragm-holder are passed through the opening the holder may be positioned by means of the projection 3 before it is secured to the diaphragm by means of cement. (See Fig. 2.) The projection 3 and the end of the stylus-holder may then be cut off, so that the diaphragm will be a perfect circle.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a talking-machine diaphragm consisting of a circular disk having an eccentric perforation and a peripheral projection, substantially as set forth.

2. As a new article of manufacture, a talking-machine diaphragm consisting of a circular disk having an eccentric perforation and a peripheral projection in line with said perfora-

tion and the center of the disk, substantially as set forth.

3. In a phonograph-recorder, a diaphragm having a perforation, a stylus-holder formed of flexible metal and comprising a socket, a flat portion resting against said diaphragm and an integral tongue passing through said perforation and bent parallel to said diaphragm, substantially as set forth.

10 4. In a phonograph-recorder, a diaphragm, a stylus-holder secured thereto and consisting of a piece of flexible metal bent to form a socket, a web of two thicknesses and a pair of laterally-projecting wings, said wings being

slit to form fastening-tongues, substantially as set forth. 15

5. In a phonograph-recorder, a diaphragm, a stylus-holder secured thereto and consisting of a single piece of flexible metal passed through said diaphragm and having portions bearing against both faces thereof, substantially as set forth. 20

This specification signed and witnessed this 10th day of February, 1905.

CHARLES L. HIBBARD.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.



No. 803,028.

PATENTED OCT. 31, 1905.

A. E. THOMAS.

TONE SOFTENING DEVICE FOR GRAPHOPHONES AND LIKE TALKING MACHINES.

APPLICATION FILED MAR. 13, 1905.

Fig. 2.

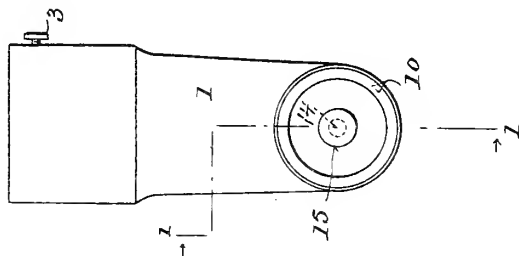
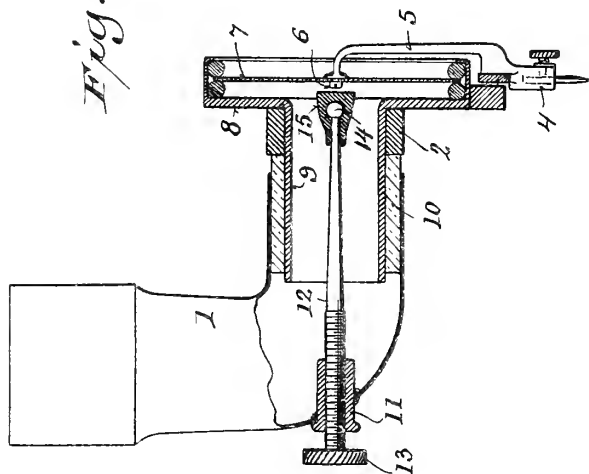


Fig. 1.



Witnesses
Geo. W. Young,
Lang. Felber.

Inventor:
Alfred E. Thomas
By H. G. Udenwood
Attorney

UNITED STATES PATENT OFFICE.

ALFRED E. THOMAS, OF MILWAUKEE, WISCONSIN.

TONE-SOFTENING DEVICE FOR GRAPHOPHONES AND LIKE TALKING-MACHINES.

No. 803,028.

Specification of Letters Patent.

Patented Oct. 31, 1905.

Application filed March 13, 1905. Serial No. 249,695.

To all whom it may concern:

Be it known that I, ALFRED E. THOMAS, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Tone-Softening Devices for Graphophones and Like Talking-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention has especial reference to devices for muffling or softening the tone of graphophones and like talking-machines; and it consists in certain peculiarities of construction and combination of parts, as will be fully set forth hereinafter in connection with the accompanying drawings, and subsequently claimed.

In the said drawings, Figure 1 is a view in elevation of a portion of a graphophone with my device applied thereto, partly in section on the line 1 1 of Fig. 2. Fig. 2 is an inner end view of the elbow or socket which receives the horn of the instrument with my device in place therein.

Referring by numerals to the said drawings, 1 represents the elbow-socket for the horn of the instrument, which in practice extends along and is supported by the arm or bar 2, (shown in section in Fig. 1,) both of which are of the ordinary construction, the horn being secured in the said socket by a set-screw 3. 4 designates the needle-holder, from which rises an arm 5, secured by screw 6 to the diaphragm 7, (usually of mica,) which receives and transmits the sound-vibrations. The diaphragm-case 8 terminates on the inner side in a metallic tube 9, which is slipped through a bore in the arm or bar 2 and then into a rubber tube 10 in the lower arm of the elbow-socket 1, all the foregoing being the old and well-known construction of devices of this class, with which the sound-vibrations are very loud and often harsh and to soften which is the object of my improvement, which will next be described.

11 designates a bearing inserted in the elbow-socket and formed with a longitudinal screw-threaded bore, through which is passed the shank 12, screw-threaded adjacent to its outer end for engagement with said threaded

bore in the bearing, the latter being of sufficient length to insure the proper centering of said shank, which preferably has a milled thumb-piece 13 at its outer end and a small knob 14 at its inner end, and over said knob a thimble of soft or crude rubber 15 is slipped, the said knob keeping the thimble in place.

When it is desired to soften or muffle the sound-vibrations, the shank 12 is screwed inward until the soft-rubber thimble 15 bears against the screw 6, and by a further turn of the said shank in the screw-threaded bearing 11 the said thimble will press against the diaphragm 7 and still further deaden the vibrations and soften the tone, and if a louder tone is at any time desired the shank 12 is turned in the reverse direction to wholly or partly withdraw the soft thimble 15 from contact with the screw 6 and diaphragm 7, so that this regulation of tone is at all times under the control of the operator, without stopping the instrument, by a simple turn of the thumb-piece 13 in the direction desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a graphophone or like talking-machine, the combination with the elbow-socket which receives the horn, and the diaphragm connected to said socket, of a screw-threaded bearing extending into said elbow-socket, a shank passed through said bearing, and a soft-rubber thimble on the inner end of said shank for contact with said diaphragm, at the desired times.

2. The combination with the horn-receiving elbow-socket, and the diaphragm of a graphophone or like talking-machine, of a screw-threaded bearing extending into the elbow-socket in line with the center of the diaphragm, a shank passed through said bearing, and screw-threaded adjacent to its outer end for engagement with the threads in said bearing, and having a knob or projection on its inner end, and a soft-rubber thimble fitted on said inner end of said shank for contact as desired, with said diaphragm, for softening or regulating the tone of the sound-vibrations thereof.

3. The combination with the horn-receiving elbow-socket and the diaphragm of a graphophone or like talking-machine, of a longitu-

dinally-movable shank extending through the lower arm of said elbow-socket, and bearing a soft-rubber thimble at its inner end for contact at desired times with the inner surface of the said diaphragm for softening or regulating the tone of the sound-vibrations thereof.

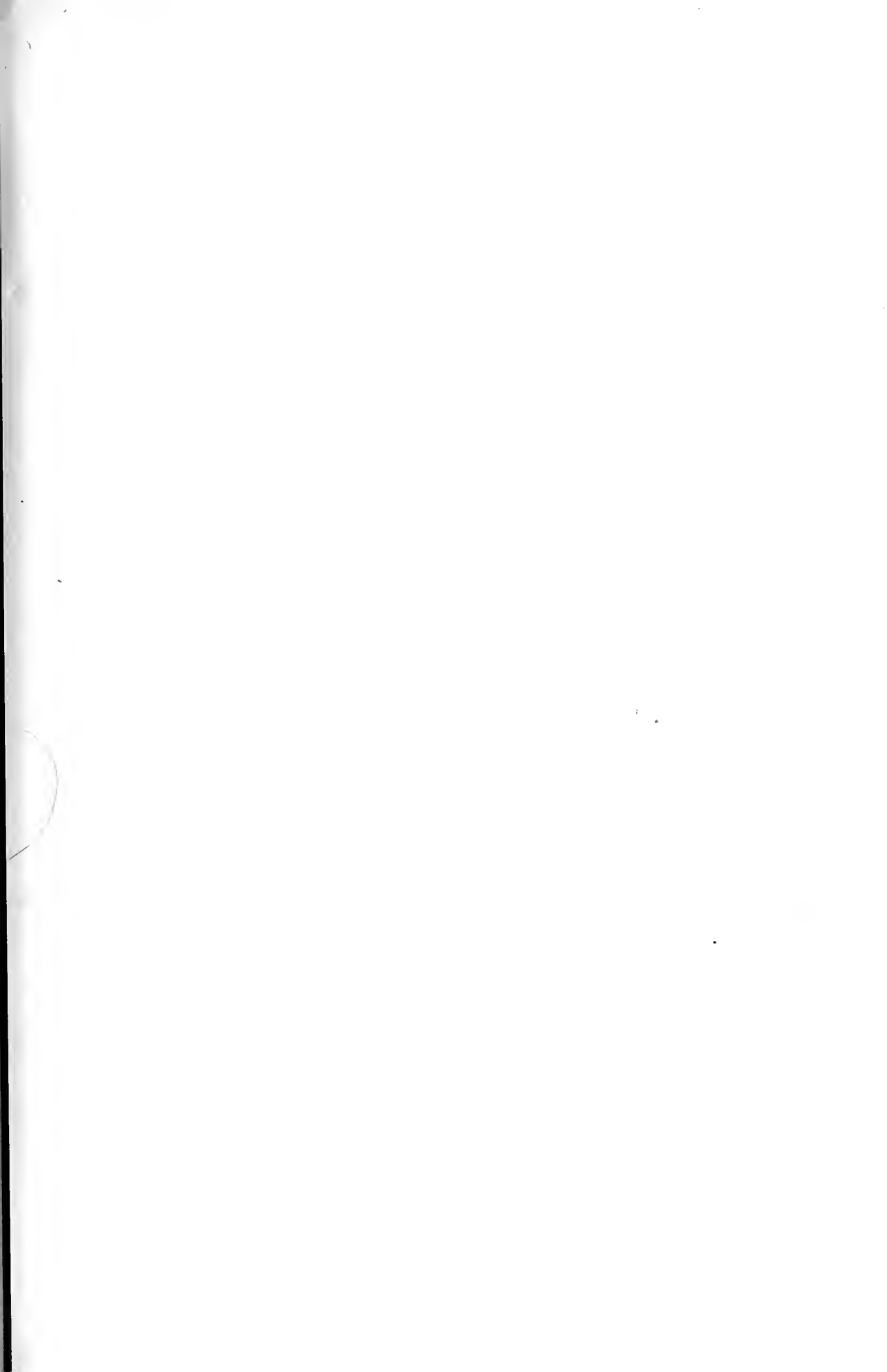
5 In testimony that I claim the foregoing I

have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

ALFRED E. THOMAS.

Witnesses:

H. G. UNDERWOOD,
GEORGE FELBER.



UNITED STATES PATENT OFFICE.

FRANCIS M. MURPHY, OF JERSEY CITY, NEW JERSEY.

DESIGN FOR A HORN FOR PHONOGRAPHS.

No. 37,661.

Specification for Design.

Patented Nov. 14, 1905.

Application filed April 6, 1905. Serial No. 254,227. Term of patent 7 years.

To all whom it may concern:

Be it known that I, FRANCIS M. MURPHY, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented a new, original, and ornamental Design for a Horn for Phonographs, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a side elevation, and Fig. 2 is a front view, of a horn for phonographs, showing my new design.

I claim—

The ornamental design for a horn for phonographs, as shown.

FRANCIS M. MURPHY. [L. S.]

Witnesses:

WILLIAM HOYER,
THEODORE V. FROST.

DESIGN.

No. 37,661.

PATENTED NOV. 14, 1905.

F. M. MURPHY,
HORN FOR PHONOGRAPHS.
APPLICATION FILED APR. 8, 1905.

Fig. 1.

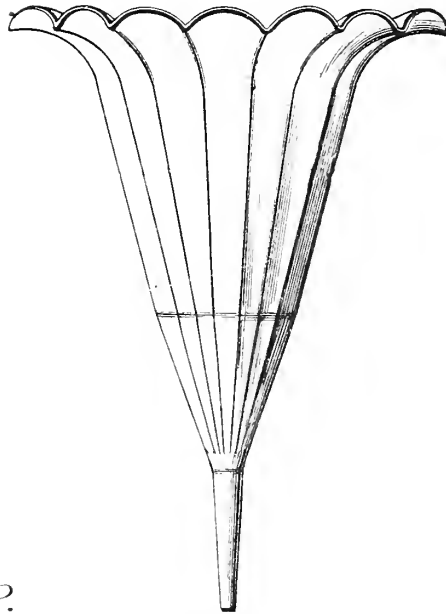
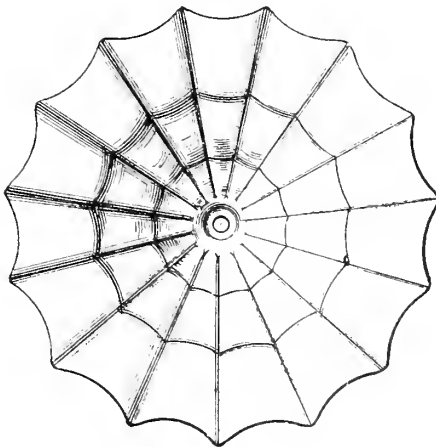


Fig. 2.



Inventor

Witnesses

F. M. Murphy
W. N. Hodson

F. M. Murphy

By,

W. A. Lacey, Attorneys





A. C. PICCININI.
MEMBRANE OF GRAPHOPHONES, &c.
APPLICATION FILED AUG. 15, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

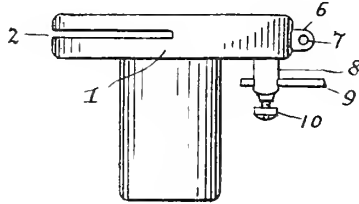


Fig. 2.

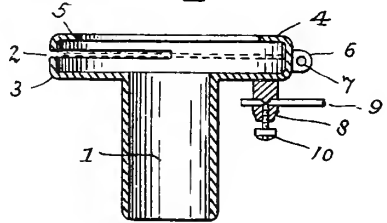


Fig. 3.

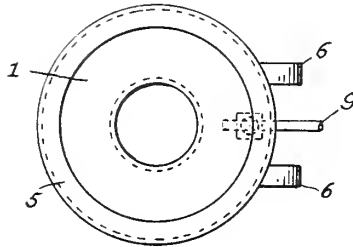


Fig. 4.

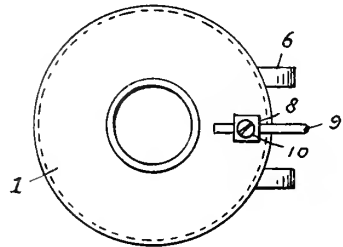


Fig. 5.

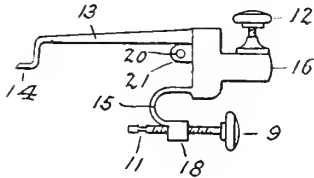


Fig. 6.

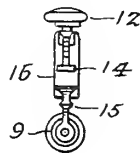


Fig. 7.

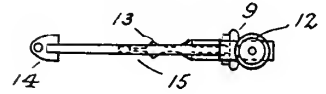


Fig. 8.

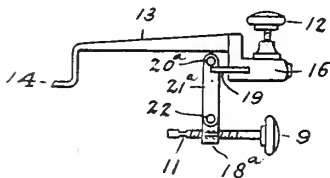


Fig. 9.

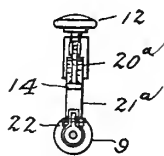
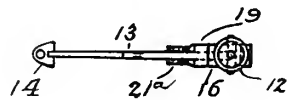


Fig. 10.



Witnesses:

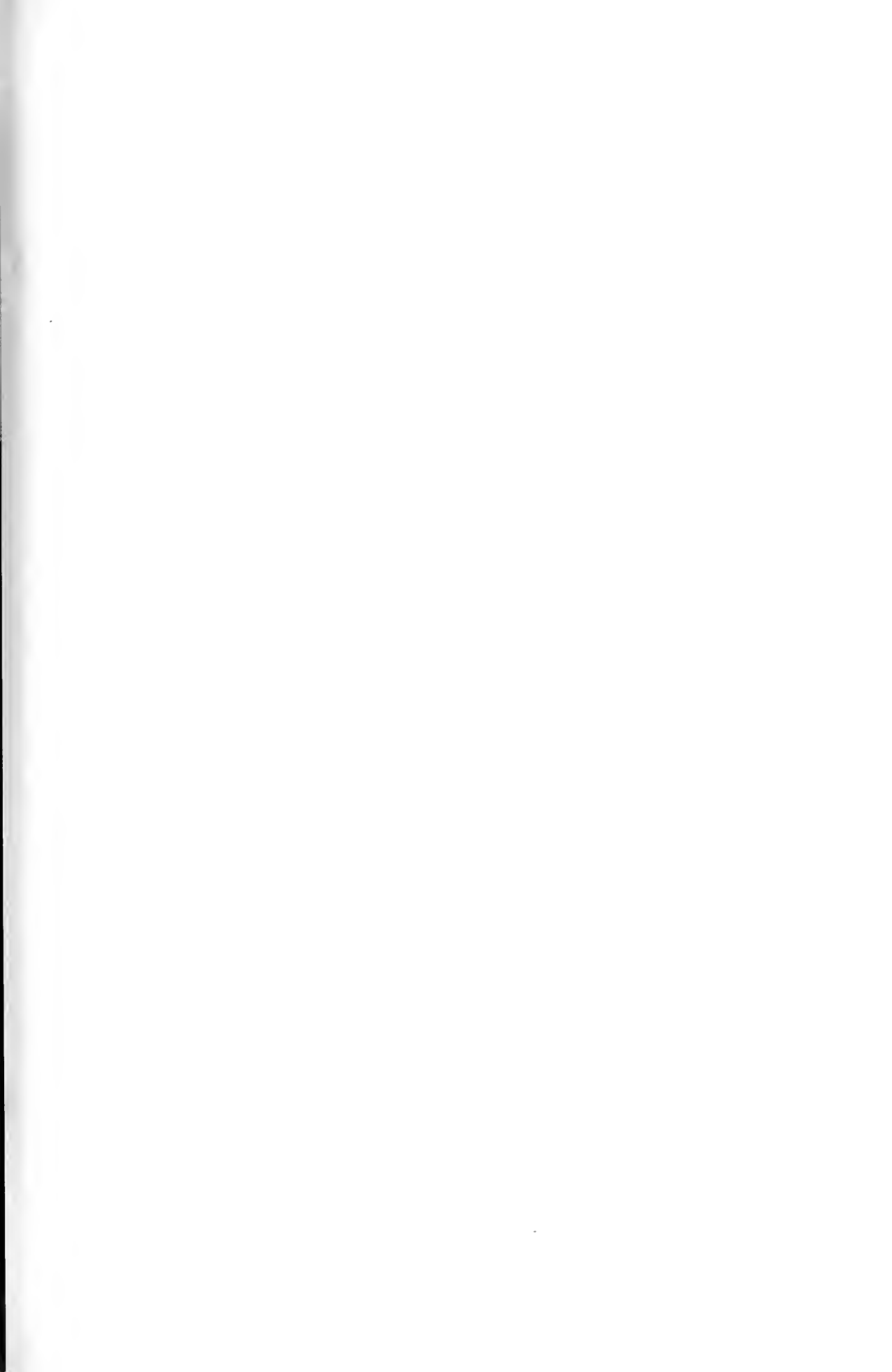
E. B. Bolton
H. M. Kuehne

Inventor:

Arturo Camilo Piccinini

By Richard [Signature]

his Attorneys.



A. C. PICCININI.
MEMBRANE OF GRAPHOPHONES, &c.
APPLICATION FILED AUG. 16, 1904.

Fig. 11.

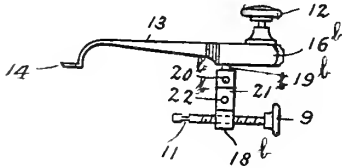


Fig. 12.

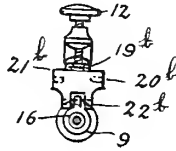


Fig. 13.

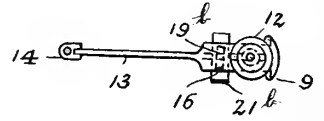


Fig. 14.

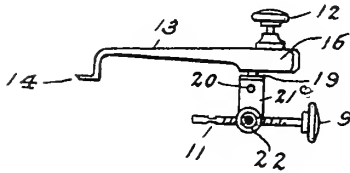


Fig. 15.

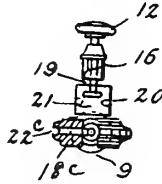


Fig. 16.

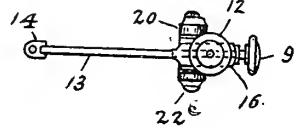


Fig. 17.

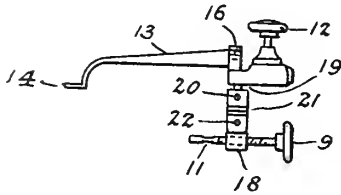


Fig. 18.

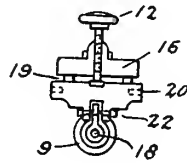


Fig. 19.

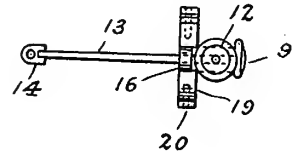


Fig. 20.

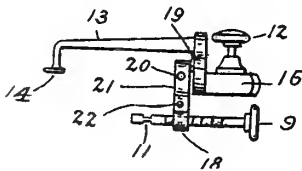


Fig. 21.

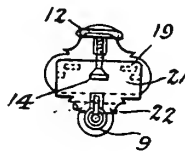
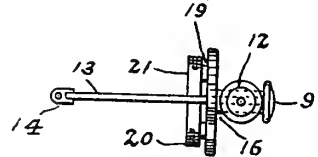


Fig. 22.



Witnesses:
E. B. Bolton
N. M. Kuehne

Inventor:
Arturo Camilla Piccinini
Richard J.
his Attorney.

UNITED STATES PATENT OFFICE.

ARTURO CAMILO PICCININI, OF BUENOS AYRES, ARGENTINA.

MEMBRANE OF GRAPHOPHONES, &c.

No. 804,264.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed August 15, 1904. Serial No. 220,848.

To all whom it may concern:

Be it known that I, ARTURO CAMILO PICCININI, a citizen of the Argentine Republic, and a resident of Buenos Ayres, in the Province of Buenos Ayres, Argentine Republic, have invented certain new and useful Improvements in Graphophones, of which the following is a specification.

My said invention relates more particularly to the sound-box casing or diaphragm-support and to the stylus-support.

The objects of the invention are to provide an extremely simple and effective form of casing or diaphragm-support which may be produced at an extremely low cost, and also one in which a multiplicity of parts is avoided, and, further, to provide an extremely simple and efficient stylus-support which may be readily assembled and quickly and accurately adjusted while the graphophone is in operation.

With these and other objects in view the invention includes the various features of construction and arrangement of parts hereinafter described, and particularly pointed out in the claims.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the diaphragm-casing. Fig. 2 is a central vertical section thereof. Fig. 3 is a top plan view, and Fig. 4 a bottom plan view, of the same. Figs. 5, 6, and 7 are respectively a side elevation, an end view, and a top view of the preferred form of stylus-support. Figs. 8, 9, and 10 are similar views of a modification thereof. Figs. 11, 12, and 13 are like views of still another form. Figs. 14, 15, and 16 are similar views of a further modification. Figs. 17, 18, and 19 are like views of a fifth form, and Figs. 20, 21, and 22 are similar views of a sixth form.

In the various figures the same or like parts are designated by the same reference-numerals.

Referring first to the casing, (shown in Figs. 1 to 4, both inclusive,) the ordinal 1 designates the diaphragm-casing, which is made of a single piece of sheet metal, having a lower tubular portion for connecting with the receiver and an upper enlarged portion of circular shape with substantially flat lower annular wall 3 and inwardly-extending opposing flange 5. The vertical peripheral wall between is slotted, as at 2, for one-half the circumference to permit the insertion of

the diaphragm, which is clamped between rubber or like clamping-rings (not shown) which lie between the opposing walls 3 and 5. At the back of the casing are located two lugs or projections which serve to pivotally connect the stylus-support, the latter having a lug 21, provided with recesses 20, designed to be engaged by screws threaded through the lugs 6. The stylus-support—as shown in Figs. 5, 6, and 7, for example—has an arm 13, which extends inward over the diaphragm-casing and has a downwardly-turned end provided with a small plate or shoe 14, which is designed to coincide with and be secured directly to the center of the diaphragm. On the side of the stylus-support opposite the arm 13 is a projecting member 16, to which the needle or stylus is designed to be connected by a set-screw 12.

From the lower part of the stylus-support extends an arm 15, which carries at its lower end a block 18, having a threaded opening through which passes a thumb-screw 9. The forward end of this thumb-screw is unthreaded, so as to enable it to turn freely in a horizontal passage in a lug or projection 8, extending from the lower rear side of the diaphragm-casing. The screw 9 is held against longitudinal displacement in the lug 8 by a set-screw 10, threaded through the lower end of the lug and the end of which engages an annular groove 11 in the thumb-screw 9. It will thus be seen that by turning the thumb-screw 9 the block or part 18 will be caused to travel along the thumb-screw and consequently the arm 13 and stylus correspondingly adjusted.

The forms of stylus-support shown in the various modifications operate in the manner just described and differ only as to details. For instance, in the form shown in Figs. 8, 9, and 10 the portion 21^a, which forms the pivotal connection, is in the shape of a bar which is connected by a small bracket 19 with the part 16. In this form the threaded block or part 18^a, through which the thumb-screw passes, is pivotally connected to the part 21^a, as shown at 22. In the form shown in Figs. 11, 12, and 13 the part 16^b is formed as a direct extension of the arm 13, and the part 20^b is connected to the under side of the part 16^b by pins 19^b and to the part 18^b by hinge-joint 21^b 22^b. In the form shown in Figs. 14, 15, and 16 the portion 21^c terminates in two arms, between which the block or section 18^c is held by small screws 22^c. The forms shown, re-

spectively, in Figs. 17, 18, and 19 and Figs. 20, 21, and 22 differ only slightly in the shape of the parts 13 and 16 and their manner of connection with part 21.

5 Having thus described my invention, what I claim is—

1. In combination, a diaphragm-casing comprising a cylindrical portion and enlarged upper portion, the bottom of the enlarged
10 portion being in a plane at right angles to the cylindrical portion and the top of said enlarged portion being bent to form an inwardly-extending flange lying in a plane parallel to
15 the bottom thereof so as to form upper and lower opposing walls between which the edges of the diaphragm is clamped and a lateral inserting-opening in the wall of the enlarged portion between said upper and lower walls.

2. In combination the diaphragm-casing;
20 having a downwardly-projecting portion con-

nected thereto, a stylus-carrying member pivotally connected to said casing, and having a downwardly-projecting portion, and a thumb-screw carried by said portion and engaging with the portion projecting from the casing for regulating the position of the stylus-carrying member substantially as described. 25

3. In combination, the diaphragm-casing, the stylus-carrying member pivotally connected thereto, a downwardly-projecting part
30 carried by said stylus-carrying member, a single thumb-screw carried thereby and a connection between the end of the screw and a part on the diaphragm-casing.

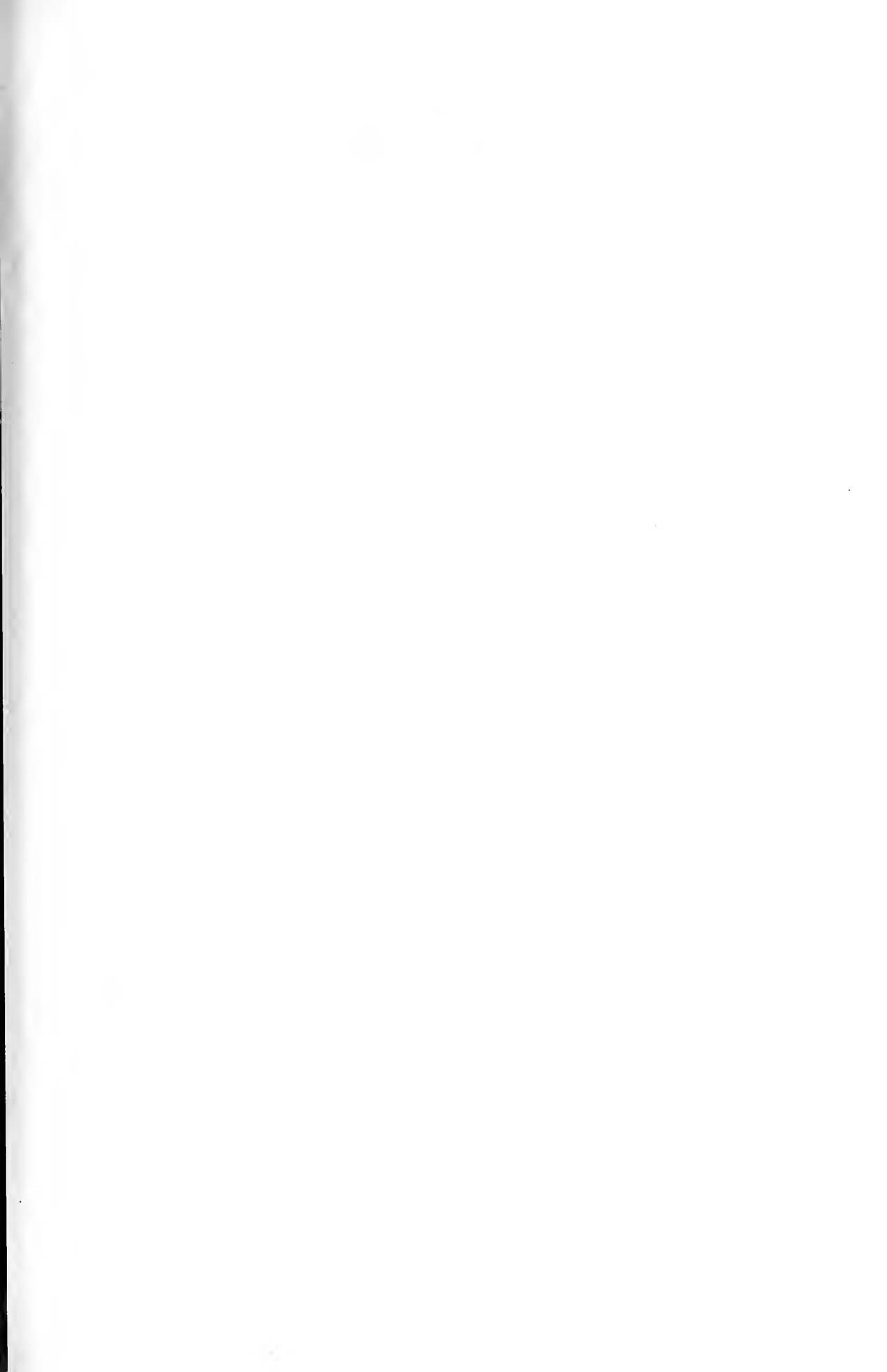
In witness whereof I have hereunto set my
35 hand in presence of two witnesses.

ARTURO CAMILO PICCININI.

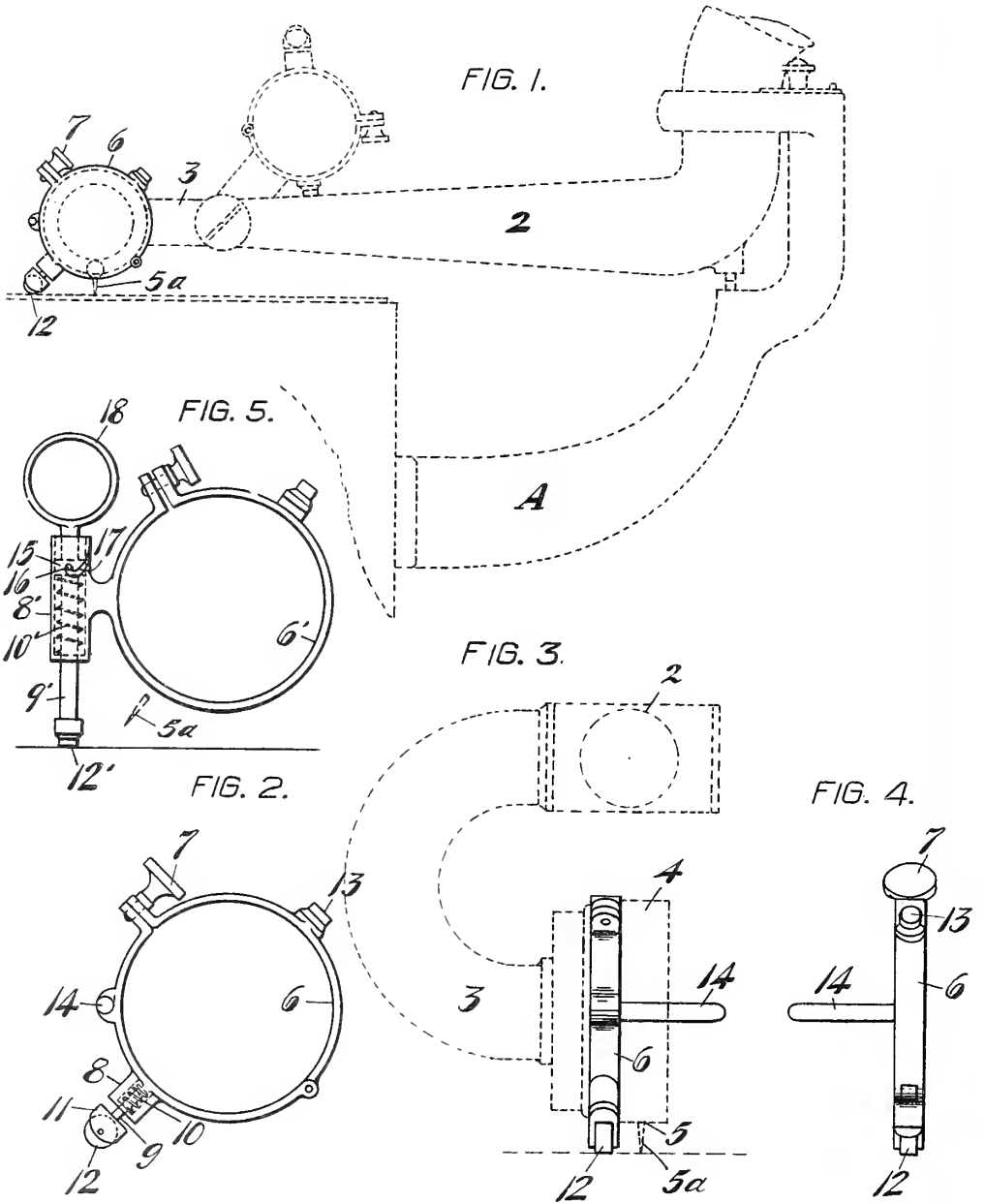
Witnesses:

I. C. MILLER,

W. M. KUEHNE.



G. KÖNIGSTEIN.
ATTACHMENT FOR TALKING MACHINES.
APPLICATION FILED SEPT. 15, 1904.



WITNESSES,
Chas. E. Chapin.
G. H. Morse

INVENTOR,
Gabor Königstein
By Geo. H. Strong atty

UNITED STATES PATENT OFFICE.

GABOR KÖNIGSTEIN, OF SAN FRANCISCO, CALIFORNIA.

ATTACHMENT FOR TALKING-MACHINES.

No. 804,477.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed September 15, 1904. Serial No. 224,524.

To all whom it may concern:

Be it known that I, GABOR KÖNIGSTEIN, a citizen of the United States, residing in the city and in the county of San Francisco and State of California, have invented new and useful Improvements in Attachments for Talking-Machines, of which the following is a specification.

My invention relates to an attachment which is especially designed for use upon the movable arms used in gramophones or talking-machines and which arms are swiveled and turnable, so that the points carried thereby conform to the movements of the disks by which the audible sounds are transmitted.

It comprises combinations of parts and details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 shows the application of my improvement, the novel parts being indicated in full lines. Fig. 2 is an end view of my improvement. Figs. 3 and 4 are side views of same. Fig. 5 shows a modification of my invention.

In the present drawings I have only shown a sufficient portion of the machine to illustrate the attachment of my devices.

A is a fixed arm, and 2 is an arm swiveled and turnable thereon. At the outer end of this arm is the U-shaped arm 3, which is swiveled and freely turnable transversely to the end of the arm 2. The free end of the arm 3 carries the ring 4, within which is the needle-carrying socket 5, so placed that when the arm 3 is turned about its swivel so as to engage the record-disk the stylus or needle carried in the socket 5 will rest upon the disk, and through the connections common to this class of machine and not here further described the sounds will be transmitted when the disk is revolved with relation to the contacting point. Considerable difficulty is experienced in the operation of this class of machines, because when a disk is to be removed or for other reason it is desirable to disconnect the pin it is necessary to turn the swivel-arm 3 about its turnable support and swing it back upon the top of the arm 2. When the disk is in place, this swiveled arm is turned to allow the point to rest upon the disk, as before described; but it frequently happens that this freely-turnable arm will slip from the fingers, and if the point drops upon the disk it will break the latter or spoil the matter which is carried by the disk, and when

turned the other way it often drops upon the light tubular arm 2, with the result that the latter will be indented and defaced. It is the object of my invention to prevent such accidents, and in order to effect this I form a ring 6, which has such interior diameter that it will clasp about the rear portion of the ring 4 and may be secured by a thumb-nut or equivalent fastening, as at 7, so that it is clamped firmly upon the ring 4.

At one side the ring 6 carries a tubular socket 8. 9 is a stem slidable in this socket and normally pressed outward by a spring, as at 10. Upon the end of the stem 9 is a head 11, which carries a rubber roller or equivalent soft buffer, as at 12. This buffer is extended downward with relation to the surface upon which the point 5^a rests, and by reason of its extension if the turnable arm should slip or be allowed to drop the rubber would first strike the plate and prevent a severe contact of the point 5^a therewith. As soon as the apparatus is in motion, however, the pressure against the buffer 12 will be sufficient to compress the spring 10 and allow the stem 9 to retract into the sleeve or support 8 sufficiently to allow the point 5^a to properly engage the channels of the disk. Upon the opposite side of the ring 6 is a buffer 13, which is so placed that when the swivel-arm 3 is turned backwardly, as previously described, this buffer will rest upon the top of the arm 2 and will prevent any defacing of said arm by reason of the accidental dropping of the swivel-arm thereon.

In the usual construction of these devices it is customary to turn the swivel-arm 3 by taking hold of the ring 4; but this is somewhat awkward and on account of its size it often causes the dropping of the device, as before stated. 14 is a handle of any suitable description projecting from the side of the ring and in such position as to be easily grasped by the operator, and by the use of this handle such accidents as herein described may be largely prevented.

In Fig. 5 I have shown a modified and in many ways a preferred form of my attachment, since it is designed to prevent the arm 3 being thrown forward violently to cause such a compression of the cushion as would even then allow the point or stylus 5^a impinging injuriously on the record-disk. Accordingly in this case the stem 9', carrying the cushion 12', is slidable in a sleeve 8', arranged to one

side rather than radially, as in Fig. 2, of the ring 6'. An expansion-spring 10' operates between a flange on the inside of the sleeve and a collar 15 on the stem to retract the stem, and the latter carries a pin 16, movable in a V-shaped cam-slot 17 in the sleeve to control the movement of the stem. The upper end of the stem may be provided with a suitable finger-hold 18 to allow its being easily operated. In practice when it is desired to throw the arm 3 forward preparatory to playing a piece the stem is first pushed outward, compressing spring 10' and slightly turning the stem to cause pin 16 to engage in the shorter portion of slot 17. This insures the buffer-cushion 12' coming in contact with the record-disk in advance of the stylus, so that no matter how carelessly or violently the arm is thrown over the sharp metal point cannot injure the record. When the cushion rests on the record, a slight turning movement of the stem by the handle 18 releases the pin, and the spring will act to withdraw the cushion and allow the stylus to engage the record. Each time a record is changed or the arm 3 is lifted the stem is turned to project the cushion outward, and again after the return of the arm to its operative position over a record the cushion is thrown and held out of commission in the manner described.

It is obvious that various other changes and modifications may be made without departing from the principle of the invention, and I do not wish to be understood as limiting myself to the specific construction here shown and described.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine of the character described, the combination of a sound-box movable toward and from the record and provided with a stylus, and means operative to engage the record for holding the stylus out of operative engagement therewith said means being shiftable about the axis of the sound-box to disengage the record and permit the latter to be engaged by the stylus.

2. A talking-machine having in combination a sound-box movable toward and from the record, and provided with a stylus, arms by which the sound-box is supported, a device attached to the sound-box and a yielding member carried by the device and engageable with the record to hold the stylus out of operative engagement therewith, said device shiftable about the box as an axis to disengage the record and permit the latter to be engaged by the stylus.

3. The combination with a talking-machine, the swiveled and turnable arm thereof, of elastic cushions or buffers carried by the free end of the turnable arm and adapted to contact respectively with the disk and with the swiveled arm substantially as described.

4. In a talking-machine having a swiveled arm and a point-carrying arm loosely turnable about the outer end of said swiveled arm, a ring detachably secured to said outer end, cushions carried by said ring, one of which rests upon the swiveled arm when the turnable part is thrown back and the other upon the disk when it is turned to direct the point upon the disk.

5. In a talking-machine, a horizontal swiveling arm a second arm swiveled and turnable about the outer end thereof, said arm having a head and a point carried thereby, a two-part hinged ring having a clamping-screw by which it is secured upon the head, cushions carried by said ring, one of which is adapted to rest upon the disk and protect said disk from the point, and the other to rest upon the arm when the head is thrown back, and a handle carried by said ring whereby the movements of the arm and head are effected.

6. In a talking-machine, a horizontal swiveling arm, a second arm swiveled and turnable about the outer end thereof, a head, and a point carried by said head, a record-disk with which said point contacts, a yielding cushion carried by said head and resting upon the disk previously to the contact of the point therewith.

7. In a talking-machine, a freely-movable head and point carried thereby, a record-disk upon which the point is adapted to rest, a tubular sleeve projecting from the head and diagonal with relation to the point, a spring-pressed stem slidable in the sleeve and a yielding cushion carried by said stem.

8. In a talking-machine, the combination with a record-disk, a stylus and the support thereof, of a stylus-support adapted for attachment to the sound-box and shiftable about the same as an axis, and resilient cushion on the stylus-support arranged to engage the record-disk in advance of the stylus.

9. In a talking-machine, the combination with a record-disk, a stylus and the support thereof, said support attachable to and turnable concentric with the sound-box of a resilient cushion on the stylus-support arranged to engage the record-disk in advance of the stylus, and means for moving and retaining said cushion to allow the impingement of the stylus with the disk.

10. In a gramophone, the combination with the record, the stylus and the stylus-support, said support attachable to and turnable concentric with the sound-box of a spring-pressed cushion carried by the stylus-support and arranged to engage the record in advance of the stylus.

11. In a gramophone, the combination with the record, the stylus and the stylus-support, said support attachable to and turnable concentric with the sound-box of a spring-pressed cushion carried by the stylus-support and ar-

ranged to engage the record in advance of the stylus, and means to disengage the cushion to allow the stylus to operate on the record.

12. In a machine of the character described, 5 the combination of a record, a sound-box movable toward and from the same and provided with a stylus, a member mounted on the outside of the sound-box and provided with 10 cushion means for holding the stylus out of operative engagement with the record, said member shiftable about the box as an axis to disengage the record and thereby to permit 15 the engagement of the stylus with the record.

13. A gramophone having in combination 15 a record, a stylus to operate thereover, a stylus-support, said support attachable to and turnable concentric with the sound-box and cushion means carried by the support and 20 adapted to contact with the record to hold the stylus out of contact with the record, or to allow it to engage said record.

14. In a gramophone, the combination with the record-disk, the stylus and a stylus-sup-

port, attachable to the ordinary sound-box and turnable about the same as a center of means 25 carried by the support to limit the movement of the stylus toward the record, said means including a spring-pressed stem movable in guides on the support, and means for holding 30 the stem at different positions in said guides.

15. In a gramophone, the combination with the record-disk, the stylus and a stylus-sup- 35 port, attachable to the ordinary sound-box and turnable about the same as a center of means carried by the support to limit the movement of the stylus toward the record, said means in- 40 cluding a normally retracted spring-pressed part and means for projecting and holding said part in advance of the stylus.

In testimony whereof I have hereunto set 40 my hand in presence of two subscribing witnesses.

GABOR KÖNIGSTEIN.

Witnesses:

ALFRED A. ENQUIST,

S. H. NOURSE.



No. 804,604.

PATENTED NOV. 14, 1905.

J. ISAKSON.
PHONOGRAPHIC INSTRUMENT.
APPLICATION FILED AUG. 22, 1904.

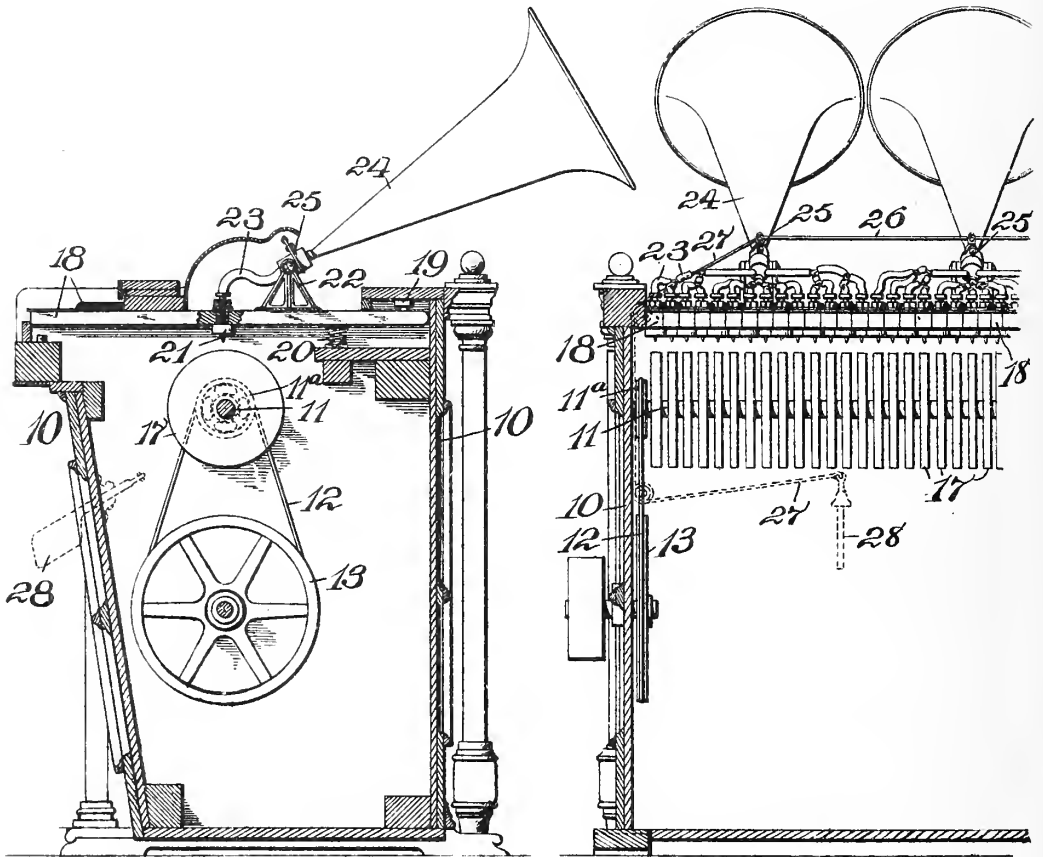


Fig. 1.

Fig. 2.

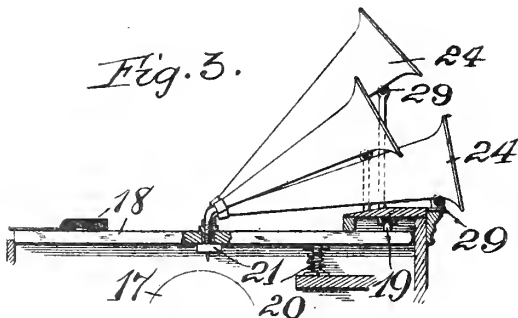


Fig. 3.

WITNESSES:

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John T. Carolan

INVENTOR.
John Isakson,
BY W. B. Hutchinson,
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN ISAKSON, OF CLINTON, MONTANA.

PHONOGRAPHIC INSTRUMENT.

No. 804,604.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed August 22, 1904. Serial No. 221,808.

To all whom it may concern:

Be it known that I, JOHN ISAKSON, of Clinton, in the county of Missoula and State of Montana, have invented a new and Improved Phonographic Instrument, of which the following is a full, clear, and exact description.

This invention relates to an instrument that reproduces sounds in accordance with the desire or wish of the performer and in any combination that is desired.

The invention further provides a means for increasing or diminishing the volume of sound issuing from the instrument, in conjunction with a complete manual device for manipulating keys to give the desired tone effect.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a cross-section of the instrument. Fig. 2 is a view of a little more than half of the instrument with the back board removed, and Fig. 3 is a view of a modification of the arrangement of the horns.

In the drawings, 10 is a casing of a suitable configuration, and it has journaled therein a shaft 11, on which is a pulley 11^a, that can be driven by means of the belt 12 and the wheel 13. It will be understood that this method of communicating a rotary motion to the shaft 11 can be displaced by any well-known means of operation.

On the shaft 11 are arranged a series of disks or records 17, that are arranged to have on their periphery a reproducing-surface embodying one tone or note or sound. If desired, this series of disks can be dispensed with and one cylinder may be employed with the reproducing-grooves at equidistant points on its periphery, as will be understood. In line with each of the reproducing-grooves is arranged a key-lever 18, pivoted, as at 19, and having a spring 20 arranged to hold it normally in place. A reproducer 21 is secured to each key-lever, and it will thus be seen that by the pressure on the key its reproducer will be thrown into contact with the reproducing-groove on its respective record and emit that particular note or sound. A series of pipes 23 lead from the reproducers to the horns or trumpets 24, these horns being pivoted, preferably, in a structure, such as 22, to permit an adjustment, so that the sound can be directed. A valve 25 is preferably placed at the small end of each horn or trumpet, and each valve is connected with the other by a rod 26. A cord or connection 27 can lead to a lever or pedal 28. This pedal is conven-

iently placed, preferably, where it can be operated by the knee of the performer. It will be seen that by the operation of this pedal 28 the valve can be opened to any desired extent or allowed to close, and in that way the volume of sound is regulated.

In Fig. 3 I show a modification where a series of horns are employed connecting each individual reproducer with a horn. The horns or trumpets are staggered so that they can be fitted in and are pivoted at 29, rocking up and down as the key is released or depressed.

It will be evident that I have devised an instrument that can give musical reproductions if each of the records 17 is adapted to give the sound of a particular note in the scale. For instance, we would employ twelve records for each chromatic scale of one octave. The instrument might be made the full seven and one-third octave, and it will be obvious that in this way a performer on the instrument could reproduce anything in the musical line that he desired without having any former performance necessary to the reproduction. Each of the records might have a pair of grooves for the reception of a pair of styli, these grooves being adapted to reproduce tones an octave apart whereby the pressure on one key would produce two notes, one an octave above the other, and in this way the volume of sound would be increased.

The records could be taken off and replaced to bring in reproductions of other instruments, such as wind instruments or string instruments, or they might be placed on the shaft in combination, some reproducing one instrument and some another, and in this way furnish a more varied set of tones.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

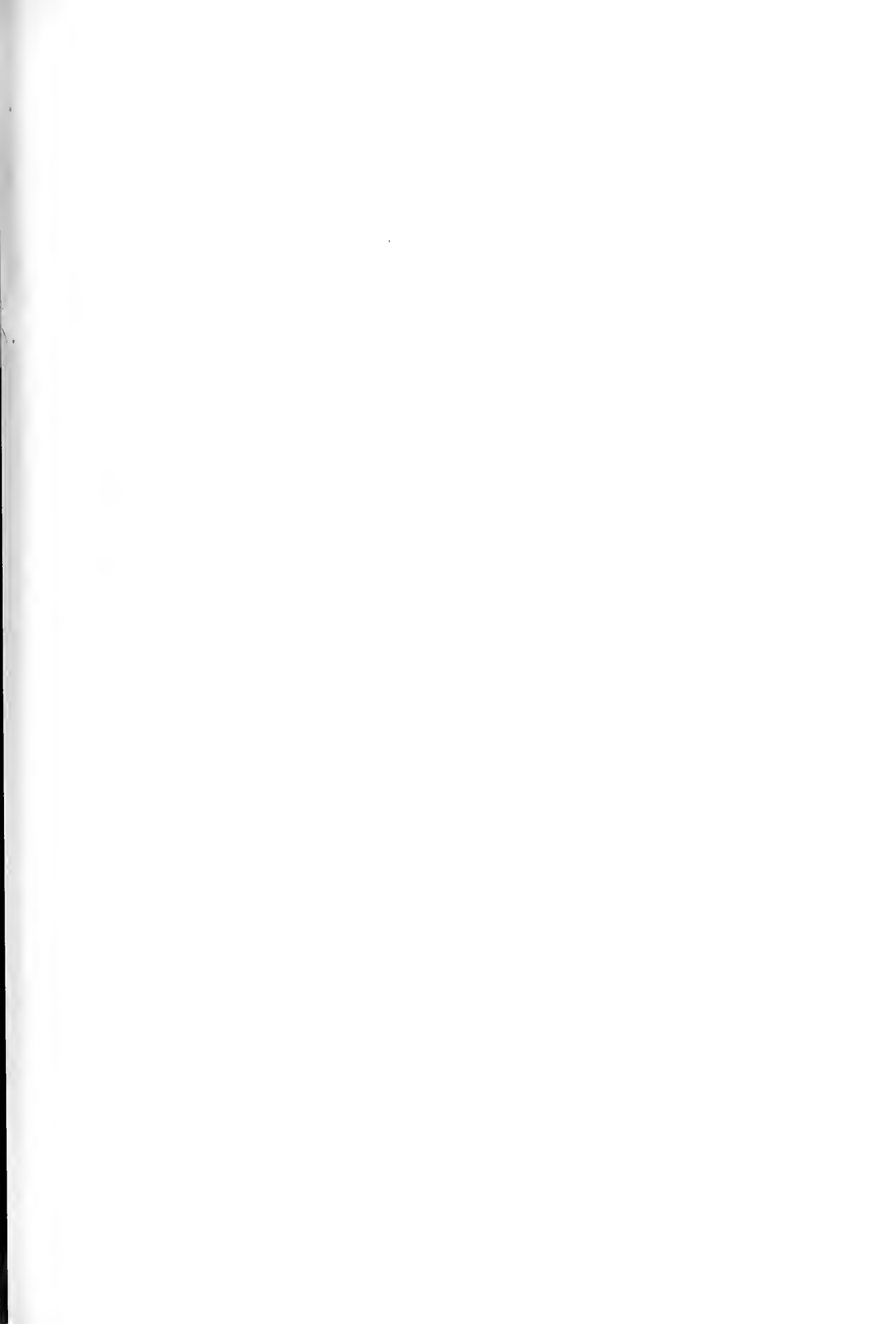
A phonographic instrument comprising a series of records, means for revolving the records, a reproducer arranged in line with each record, manually-operated means connected with each reproducer to throw it in engagement with each record, sound-directing devices, flexible connections between each reproducer and the sound-directing means, a valve arranged in each sound-directing device, and means to simultaneously operate the valves.

JOHN ISAKSON.

Witnesses:

J. ALAN ANDREW,
IRMING EHIRT.

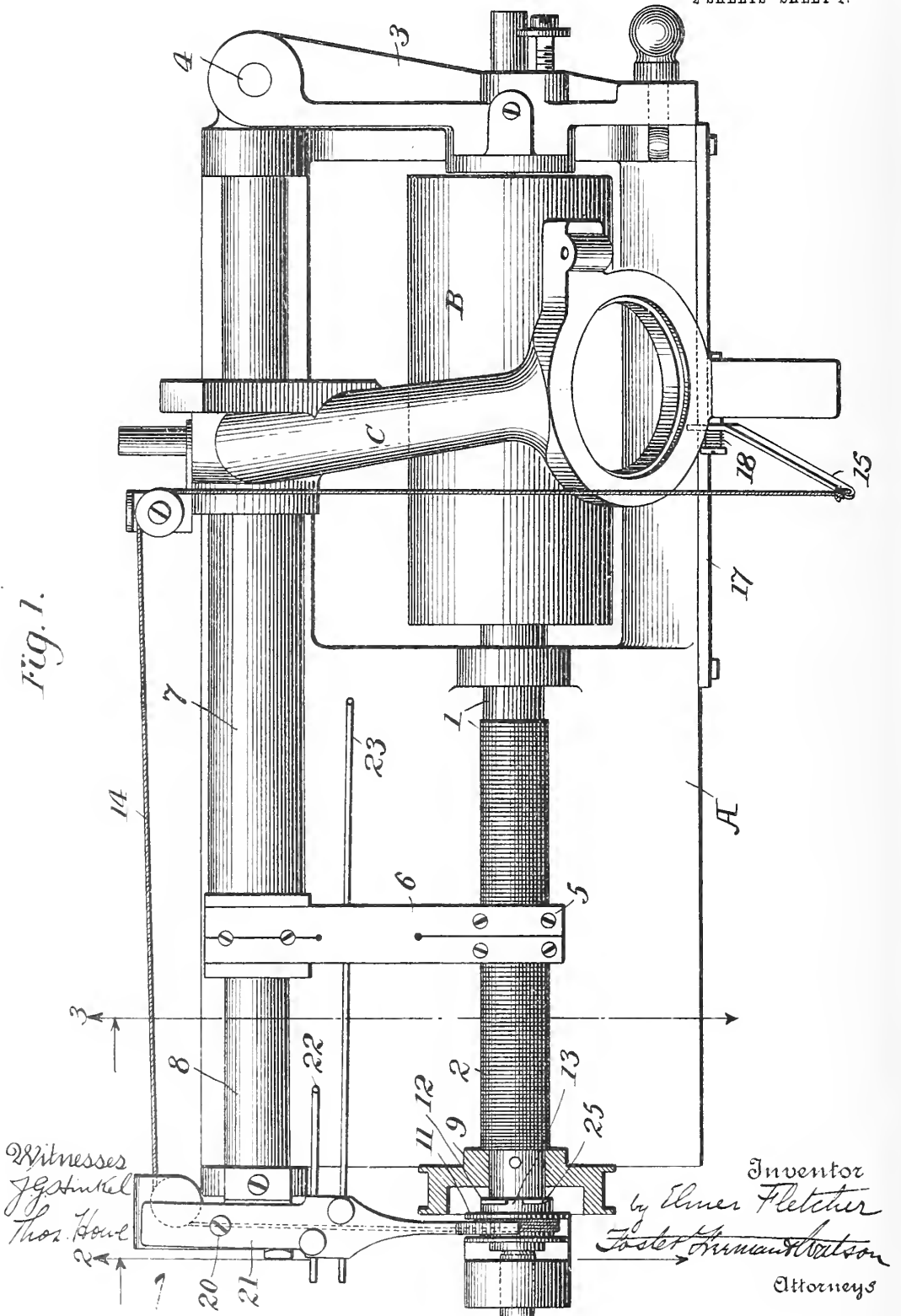


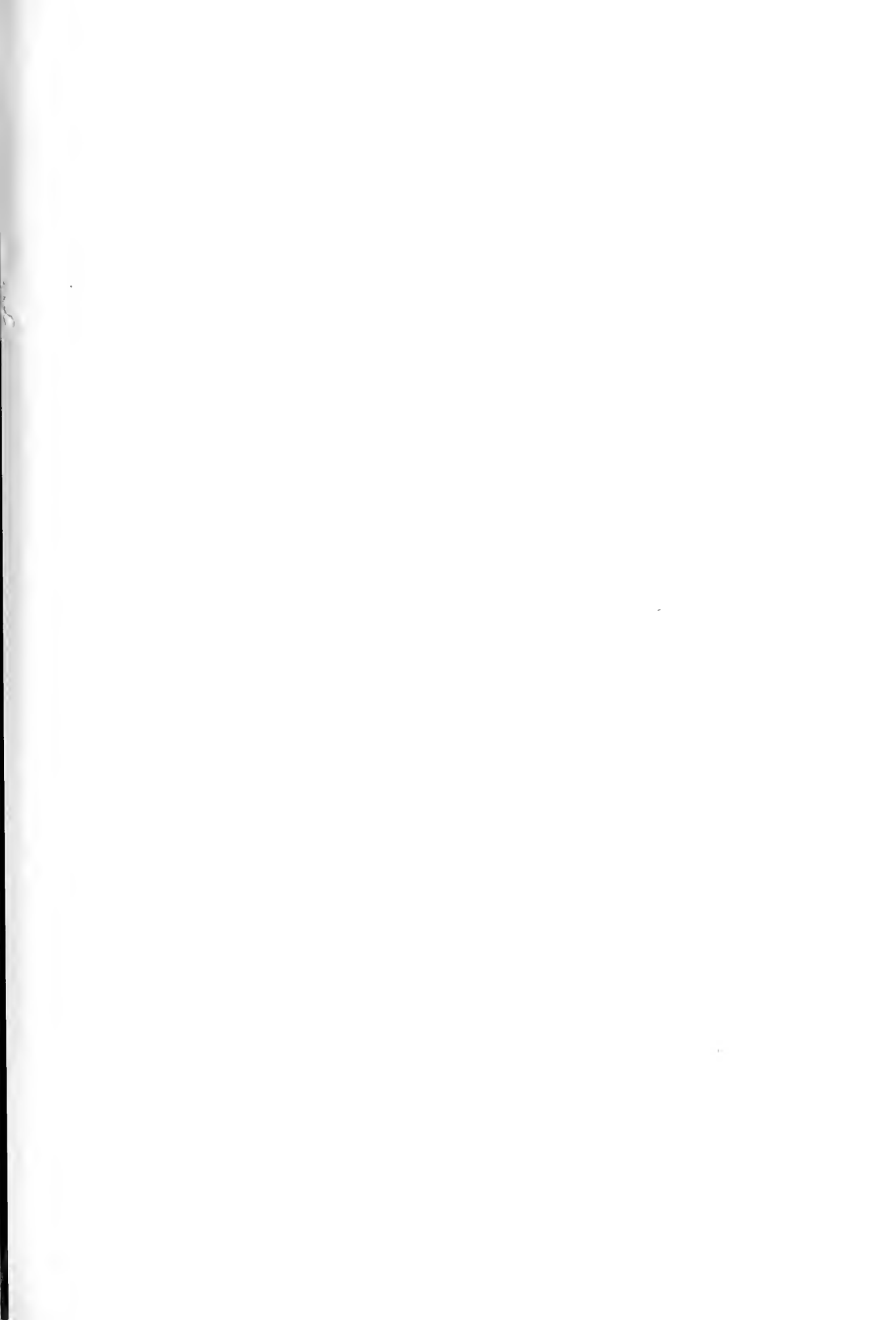


E. FLETCHER.
REPEATING DEVICE FOR PHONOGRAPHS.

APPLICATION FILED NOV. 11, 1904.

2 SHEETS—SHEET 1.





E. FLETCHER.
REPEATING DEVICE FOR PHONOGRAPHS
APPLICATION FILED NOV. 11, 1904.

2 SHEETS-SHEET 2

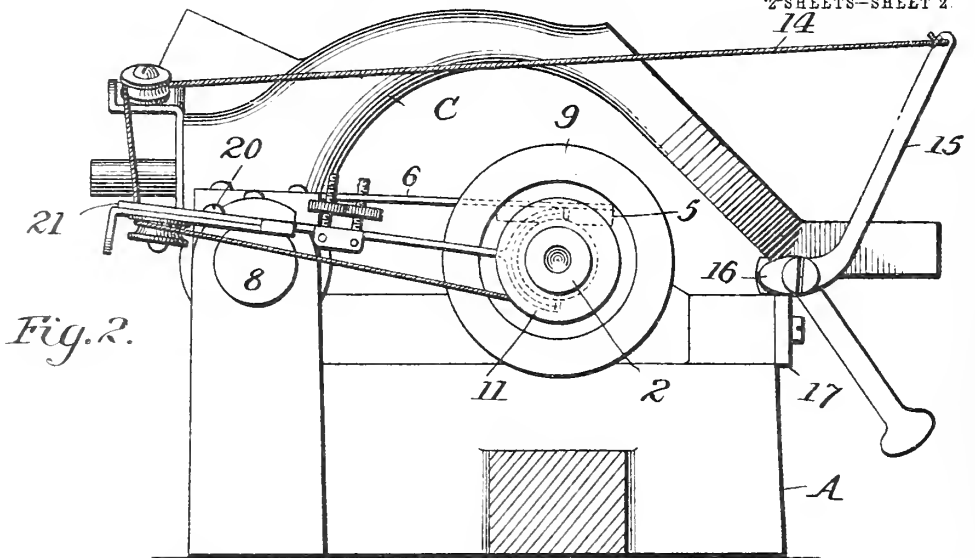


Fig. 2.

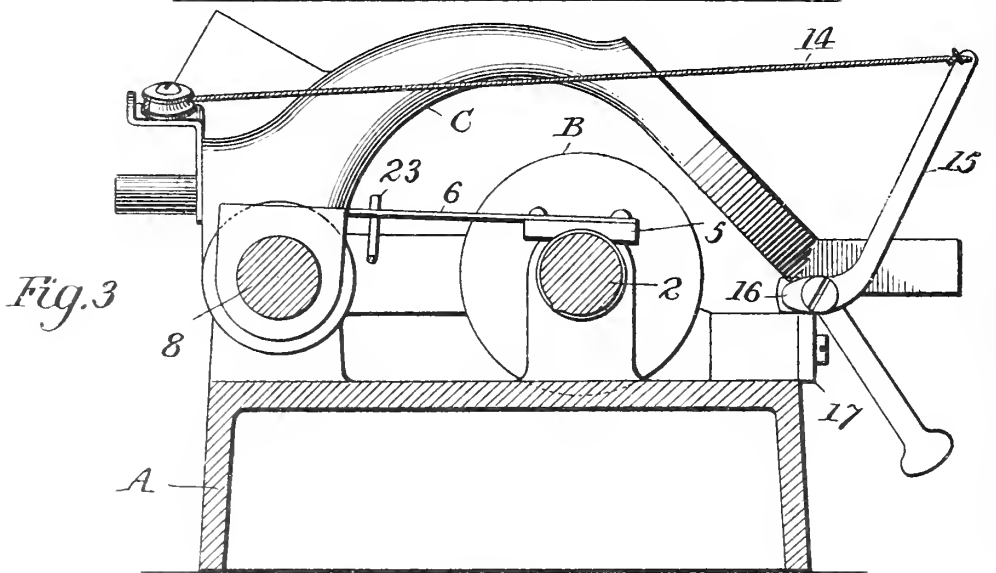


Fig. 3.

Fig. 4.

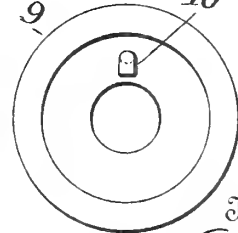
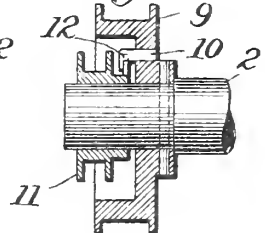
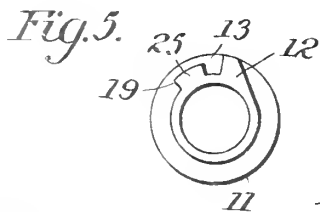


Fig. 6.

Witnesses
J. G. Smith
Thos. Howe

Inventor
Elmer Fletcher
by *J. Foster & Mansfield*
Attorneys

UNITED STATES PATENT OFFICE.

ELMER FLETCHER, OF INDIANAPOLIS, INDIANA.

REPEATING DEVICE FOR PHONOGRAPHS.

No. 804,714.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed November 11, 1904. Serial No. 232,313.

To all whom it may concern:

Be it known that I, ELMER FLETCHER, a citizen of the United States, residing at Indianapolis, in the county of Marion, State of Indiana, have invented certain new and useful Improvements in Repeating Devices for Phonographs, of which the following is a specification.

This invention relates to repeating devices for phonographs whereby the recorder and reproducer is returned to its initial position after it has completed its operative movement.

The object of the invention is to provide improvements in apparatus of the character described, as will be hereinafter set forth.

In the accompanying drawings, Figure 1 is a top plan view of an apparatus embodying my invention. Fig. 2 is an end view of the apparatus shown in Fig. 1 looking in the direction of the arrow. Fig. 3 is a section on the line 3 3 of Fig. 1 looking in the direction of the arrow. Fig. 4 is a central vertical section of the clutching means for connecting the driving means with the recorder and reproducer to return it to its starting position, and Figs. 5 and 6 are details of the clutching means shown in Fig. 4.

Referring to the drawings, the apparatus comprises a frame A, in which is rotatably supported a cylinder B, upon the surface of which is carried the record or upon which the record is to be formed. Adapted to engage with the surface of the cylinder in a well-known manner is a recorder and reproducer, (not shown,) carried in the usual hinged bracket C. Means are also provided for moving the bracket C in one direction, so that the stylus of the reproducer and recorder is in contact with the cylinder B. Means are also provided for moving the bracket in the other direction and disengaging the stylus from the cylinder and the means which was employed to drive it in the opposite direction.

The apparatus will now be described in detail.

Rotatably supported in the frame A is a shaft 1, carrying a worm 2, which is fixed to the shaft, and the cylinder B, which is also fixed to the shaft. To permit the removal of this shaft, the end 3 of the frame A is hinged at 4, so that it may be swung out of the way and the shaft withdrawn from that end of the apparatus. Engaging with the worm 2 is a section 5 of a nut fixed to an arm 6, which is preferably a spring, to hold the nut in engagement with the worm. The arm 6 is fixed to a sleeve 7, which may turn upon a rod 8, fixed

to the frame A. Also fixed to the sleeve 7 is the bracket C, before described. Fixed to the shaft 1 is a pulley 9, which may be driven from any suitable source of power, having an L-shaped projection 10, which is laterally wedge-shaped. Loosely mounted upon the shaft 1 is a pulley 11, having a projection comprising two parts 12 and 25, which are separated by a slot 13, the part 12 being higher than the part 25, as shown. The lateral edge 19 of the part 25 is wedge-shaped, as shown. This projection is adapted to engage with the projection 10 upon the pulley 9 to connect the pulley 11 with the source of power. Upon the pulley 11 is wound a cord 14, which after passing over suitable guide-pulleys is secured to one end of a lever 15, pivoted to the bracket C near its front end and having a cam projection 16, adapted to engage with the top of a longitudinal bar 17. The end of the lever to which the cord is secured is normally forced outwardly by a coiled spring 18, so that the projection 16 is moved into a position whereby the bracket C is permitted to keep its lowest position, so that the stylus of the recorder and reproducer may come in contact with the surface of the cylinder B and also that the nut-section 5 may engage with the threads of the worm 2. If, however, a pull is exerted on the cord 14, the projection 16 is thrown downwardly and coming against the bar 17 raises the bracket C, thereby removing the stylus of the recorder and reproducer from contact with the surface of the cylinder B, and through the sleeve 7 and arm 6 raises the nut-section 5 out of engagement with the worm 2.

Pivoted upon the frame A at 20 is a lever 21, carrying fixed rods 22 and 23, one of which is adapted to engage with the arm 6 at one end of its travel, while the other rod is adapted to engage with said arm near the other end of its travel. The end of the lever 21 engages with the pulley 11, so that this pulley is shifted along the shaft 1, according to the movement of the lever, and is thus shifted into engagement with the driving-pulley 9 to raise the recorder and reproducer out of engagement with the surface of the cylinder and the nut-section 5 out of engagement with the worm and return the bracket C to its initial position when it has reached the end of its travel, and therefore the arm 6 has come against the bent end of the rod 23. The end of the lever 21 which engages the pulley is preferably forked, as shown, so that the pulley is engaged on opposite sides, where-

by binding of the pulley upon the shaft, as would be the case if the pulley were engaged on one side only, is prevented. When the bracket C has reached its initial position, the arm 6 comes against the bent end of the rod 22, thereby shifting the pulley 11 out of engagement with the pulley 9, when the stylus will again be permitted to come in contact with the surface of the cylinder B and the nut-section 5 to engage with the worm.

The operation may be briefly described as follows: The parts being in the positions as shown, the bracket C, and with it the reproducer and recorder, the stylus of which is in engagement with the surface of the cylinder B, is moving toward the right, being driven by the nut-section 5, which is in engagement with the worm 2, driven by the pulley 9. Upon nearing the end of the right-hand travel the arm 6 comes in contact with the bent end of the rod 23, thereby drawing the pulley 11 toward the pulley 9, so that the lateral wedge-shaped edges of the projection 10 and part 25 overlap each other, thereby causing engagement of the pulley 9 with the pulley 11, when the turning of the pulley 11 will exert a pull upon the cord 14, which will operate, as before described, to raise the reproducer and recorder and the nut-section 5 out of engagement. The wedge-shaped edges of the projections are knife-edges. Generally the pitch of the worm is one one-hundredth of an inch or less, and consequently the overlapping of the projections would be very slight and uncertain if means were not employed which would increase the overlapping of the projections beyond that which would occur from the shifting of the lever by the screw after the ends of the projections had come into the same plane. With the present apparatus it will be seen that the pull upon the cord transmitted through these overlapping projections will cause them on account of their wedge shape to draw the pulleys 9 and 11 more closely together, until finally the projection 10 will rest against the part 12 of the projection on the pulley 11, when the engagement between the pulleys will be secure. The sleeve 7 and its connected apparatus having been thus moved to the left, near the end of its travel the arm 6 will come against the bent end of the rod 22, thereby pushing the pulley 11 away from the pulley 9, when the projection 10 will pass through the slot 13 and the pulleys become disengaged from each other. The apparatus will then be in readiness for a repetition of the movement toward the right.

Without being limited to the precise construction shown and described, what I claim is—

1. In a phonograph, the combination with a reproducer and recorder, of means for driving said reproducer and recorder, and connecting means between said driving means and

said reproducer and recorder such that the driving effort tends to more securely connect said reproducer and recorder with said driving means, substantially as described.

2. In a phonograph, the combination with a reproducer and recorder, of means for driving said reproducer and recorder, projections connected to said driving means, and projections connected to said reproducer and recorder and overlapping the projections connected to said driving means, the whole being so constructed and arranged that the driving effort tends to increase the overlapping of said projections, substantially as described.

3. In a phonograph, the combination with a reproducer and recorder, of means for driving said reproducer and recorder, wedge-shaped projections connected to said reproducer and recorder, wedge-shaped projections connected to said driving means, and means for causing said projections to overlap each other near the end of the travel of said reproducer and recorder, substantially as described.

4. In a phonograph, the combination with a reproducer and recorder, of a worm engaging with said reproducer and recorder, means for driving said worm, laterally-wedge-shaped projections connected to said worm, laterally-wedge-shaped projections connected to said reproducer and recorder, and means for disengaging said reproducer and recorder from said worm and causing the overlapping of the wedge-shaped edges of said projections near the end of travel of said reproducer and recorder, substantially as described.

5. In a phonograph, the combination with a reproducer and recorder, of means for driving said reproducer and recorder, wedge-shaped projections connected to said driving means and said reproducer and recorder, and a slot in one of said projections whereby the projection engaging therewith may pass outwardly to disengage said reproducer and recorder from said driving means, substantially as described.

6. In an attachment for reversing the movement of a reproducer on a phonograph, a feed-shaft and record-mounting drum, means for rotating the said shaft, a carriage movably mounted and in close proximity to the record and provided with a reproducer, rotatable means movably mounted on the feed-shaft, shift means pivotally mounted and adapted to engage the rotatable means on the feed-shaft, and means on the carriage for contacting the shift means so that the rotatable means on the feed-shaft may be longitudinally moved on the latter.

7. In an attachment for reversing the movement of a reproducer on a phonograph, a feed-shaft and record-mounting drum, means for rotating the shaft, a carriage movably mounted in close proximity to the record and provided with a reproducer, a collar rotatably and movably mounted on the feed-shaft, shift

means pivotally mounted and engaging the collar, and means on the carriage for engaging the shift means, so that the collar may be longitudinally moved on the feed-shaft.

5 8. In an attachment for reversing the movement of a reproducer on a phonograph, a feed-shaft and record-mounting drum, means for rotating the said shaft, a carriage movably mounted in close proximity to the record and
 10 provided with a reproducer, a collar rotatably and movably mounted on the feed-shaft and provided with circumferentially - disposed

grooves, shift means pivotally mounted and engaging the grooves in the collar, and means on the carriage for engaging the shift means
 15 and operating to move the collar longitudinally on the feed-shaft.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ELMER FLETCHER.

Witnesses:

L. GOWER,
 L. SEIBERT.

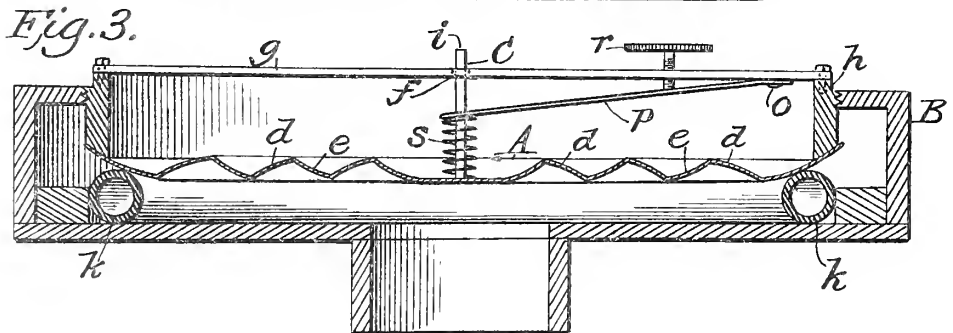
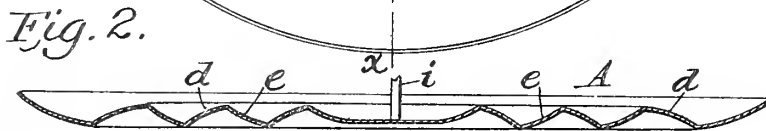
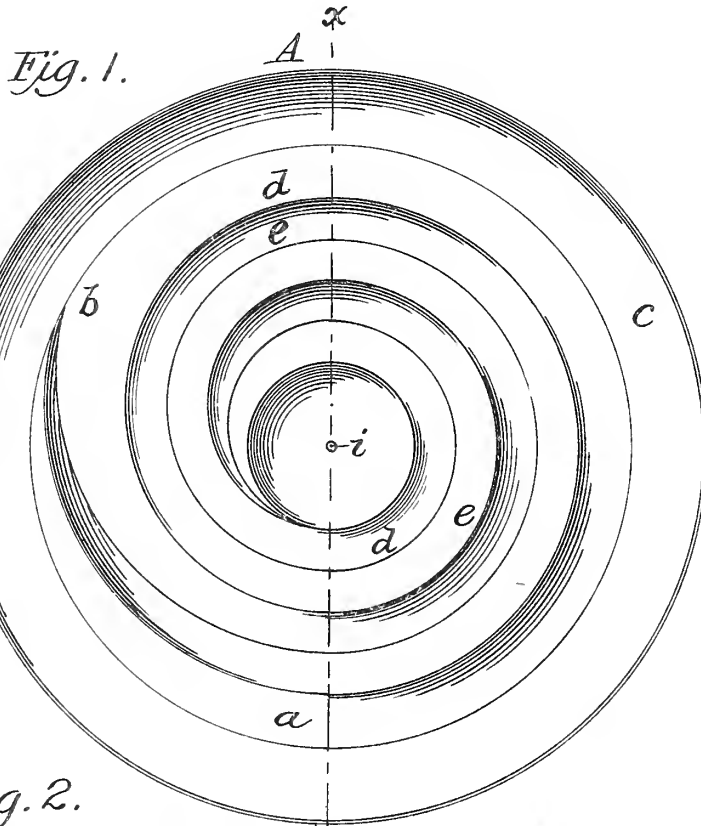




No. 804,903.

PATENTED NOV. 21, 1905.

J. H. VAN MATER.
ACOUSTIC DIAPHRAGM.
APPLICATION FILED MAY 25, 1905.



WITNESSES:

James F. Duhamel
Ruben Greene

INVENTOR:

John H. Van Mater
By his Attorney
Abel Malcomson

UNITED STATES PATENT OFFICE.

JOHN H. VAN MATER, OF ATLANTIC HIGHLANDS, NEW JERSEY.

ACOUSTIC DIAPHRAGM.

No. 804,903.

Specification of Letters Patent.

Patented Nov. 21, 1905

Application filed May 25, 1905. Serial No. 262,124.

To all whom it may concern:

Be it known that I, JOHN H. VAN MATER, a citizen of the United States, residing at Atlantic Highlands, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in Acoustic Diaphragms for Recording and Reproducing Sound and Speech; and I declare the following to be a description thereof.

My invention relates to an improved formation of acoustic diaphragms for recording and reproducing sound-waves and the manner of using the same.

The principal objects sought to be accomplished by my invention are the inclination to a central point of the waves of sound produced by the vibrations of an acoustic diaphragm and the steadying of the vibratory action of the diaphragm when in use. The first of these objects I secure by a novel conformation of the face of the diaphragm, and the second object is effected by a central spring which acts as a governor for the diaphragm, all of which will hereinafter be more particularly set forth.

Other points of my invention will be set forth in the following specification and appear in the drawings.

Figure 1 is a plan or face view of the diaphragm. Fig. 2 is a central cross-section of Fig. 1 on line *x x*, and Fig. 3 shows a cross-section of the diaphragm-holder with the diaphragm in place.

In the drawings, A represents the diaphragm, which I prefer to make of thin metal, although other materials may be used.

B represents the holder in which the diaphragm is located for use.

The main portion or body of the diaphragm is formed into a spiral ridge *a*, beginning near the center and gradually widening until it terminates near the circumference at *b*. Between its circumference and the outer termination of the spiral ridge or corrugation the diaphragm forms a concentric flat ring *c*, which is tilted or inclined at an angle to the plane of its face. The spiral ridge *a* is formed so that it is highest at its longitudinal center; but the sides are different in form. On its outer face the spiral ridge or corrugation *a* descends in a convex curve to the plane of the diaphragm, as shown at *d*, while on the inner side it is concave, as shown at *e*.

It will be observed that when the diaphragm is made of a thin sheet of metal or other mate-

rial by stamping or turning it up on a former the corrugation or spiral ridge *a* will present a concave surface toward the center on both sides.

C is a pin secured to the center of the diaphragm and extending through a hole *f* in the cross-bar *g*, which is secured to the retaining-ring *h* of the diaphragm-holder B. The end *i* of the pin C is intended to be connected with any of the various styles of recorders or reproducers. (Not shown.)

Around the pin C and resting on the diaphragm is a spring *s*, which bears against the diaphragm with sufficient pressure to steady it. Where the diaphragm is of small size, the spring *s* may be dispensed with, the diaphragm resting on the supports at its circumference only. The spring *s* may bear at one end against the cross-bar *g* and good results be obtained. On the under side of the cross-bar *g* is a metal plate *p*, which is secured at one end *o* to the cross-bar, the other end resting on the spring *s*. A thumb-screw *v* is set through the bar *g* and bears on the plate *p* to regulate the pressure of the spring on the diaphragm. The regulating-plate *p* is either forked or pierced at its free end where it rests on the spring *s*, so as not to bind on the pin C. On the inside of the holder B is a cushion *k*, on which the flat rim of the diaphragm rests, and is held in place by the impinging thereon of the retaining-ring *h* of the holder.

When made and used in this way, the diaphragm may be of any desired size and quite thin, as the spiral corrugation or ridge *a* will tend to stiffen it inside of the outer flat rim *c*, and the spring *s* takes up any tendency to limpness.

I have described the preferred way of constructing and using my device; but various modifications may be employed without departing from the spirit of my invention. For instance, where the inner face of the corrugation or ridge *a* is concave in form advantage is obtained where the corrugation is even concentric as well as spiral, and again where the spiral form of ridge is used great benefit is secured even when the inner face thereof is not concave.

The design in making the inner face of the corrugation concave is to reflect or centralize the sound-waves. By forming the inner side of the ridge concave and the outer convex both sides of the diaphragm will have the in-

ner face of the corrugations concave when the disk is of thin material and pressed or turned up. I do not, however, wish to limit myself to a diaphragm composed of a disk which is
 5 pressed or turned up, as a diaphragm one side of which is flat and the other formed with a spiral wave on its face will accomplish beneficial results irrespective of the form of the side of the diaphragm receiving the impact
 10 of the sound-waves.

The cushion *h* on which the diaphragm rests may be solid and made of leather or even soft wood, if desired.

I claim—

15 1. An acoustic diaphragm for reproducing or recording sound, comprising a disk with an operative surface in the form of a spiral ridge commencing near its center and terminating near its circumference, substantially
 20 as shown and described.

2. An acoustic diaphragm for reproducing or recording sound, comprising a disk with an operative surface in the form of a succession of circling ridges, the inner face of such
 25 ridges being concave, substantially as shown and described.

3. An acoustic diaphragm for reproducing or recording sound, comprising a disk with an operative surface in the form of circling
 30 ridges the inner sides of which are concave and the outer face thereof convex, substantially as shown and described.

4. An acoustic diaphragm for the recording or reproduction of sound comprising a
 35 disk having an operative surface composed of a spiral ridge beginning near the center and terminating near the circumference, said spiral ridge having its inner side concave and the outer side convex substantially as shown
 40 and described.

5. An acoustic diaphragm for the purposes described, comprising a disk of thin metal having stamped or spun therein and there-
 through a spiral ridge beginning near the cen-

ter and terminating near the circumference, 45 substantially as shown and described.

6. An acoustic diaphragm for the recording or reproduction of sound, having an operative surface comprised of a spiral ridge and an outer plain rim turned at an angle to
 50 its face, substantially as shown and described.

7. In apparatus for recording and transmitting sound, an acoustic diaphragm, held at its circumference in a holder, a cross-bar
 55 diametrically spanning said holder, an actuating-pin secured to the center of the diaphragm adapted to connect with the usual cutter or reproducing tool, and a spiral spring surrounding the actuating-pin between the
 60 cross-bar and diaphragm, said spring exerting pressure between the face of the diaphragm and the cross-bar substantially as shown and described.

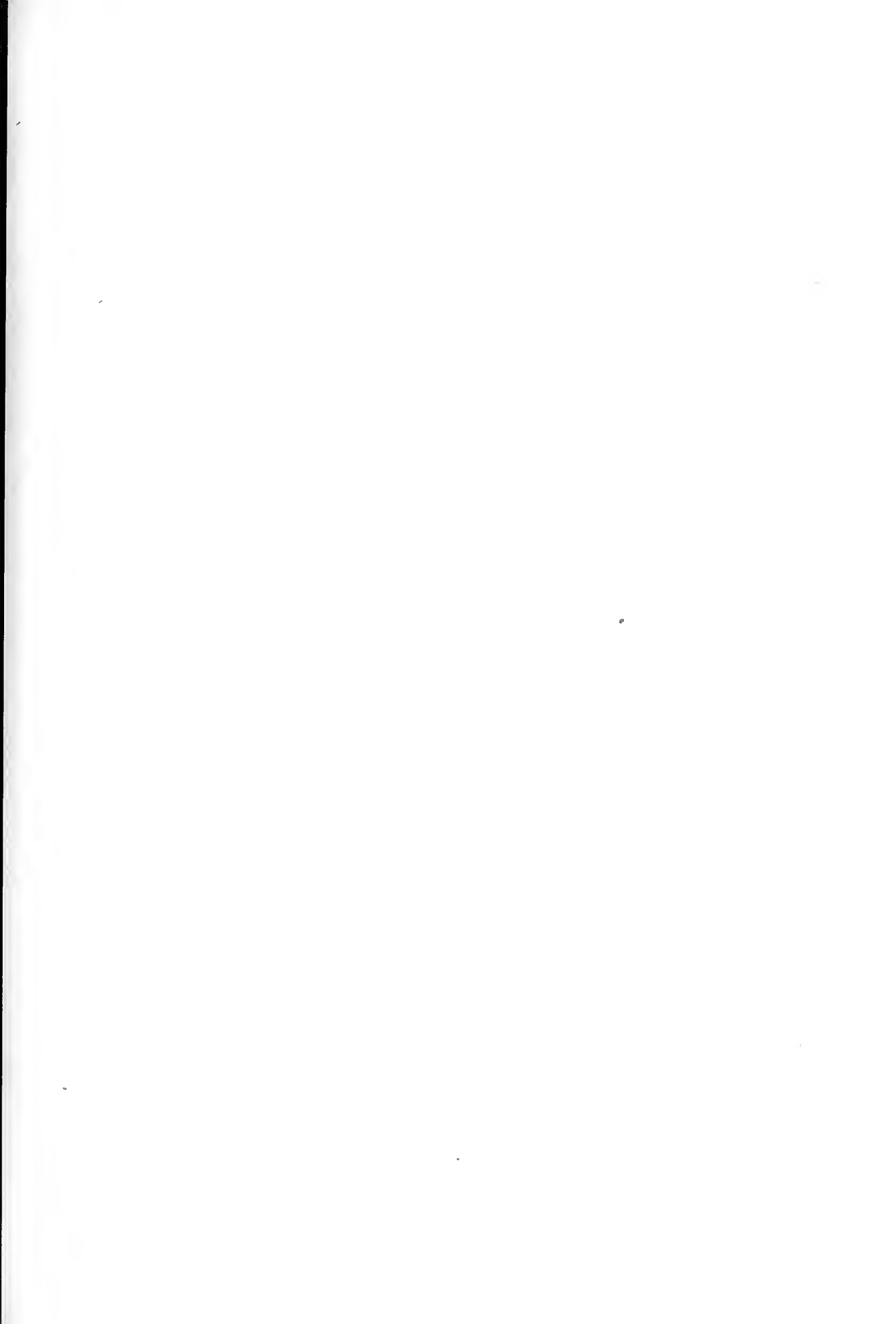
8. In apparatus for recording and transmitting sound, an acoustic diaphragm, held
 65 at its circumference in a holder, a cross-bar diametrically spanning said holder, an actuating-pin, secured to the center of the diaphragm, adapted to connect with the usual cutter or reproducing tool, a spiral spring
 70 surrounding the actuating-pin, between the cross-bar and diaphragm, said spring exerting pressure between the face of the diaphragm and the cross-bar and means for varying the pressure exerted by said spiral spring
 75 on the diaphragm substantially as shown and described.

9. In apparatus for recording and reproducing sound, an acoustic diaphragm having
 80 a central pin and surrounding spring combined with a holder having means for retaining the spring under tension against the center of the diaphragm, substantially as shown and described.

JOHN H. VAN MATER.

Witnesses:

JOHN E. FOSTER,
 FRANK W. REITER.



R. A. ANTHONY.
SOUND CONVEYING APPARATUS.
APPLICATION FILED MAR. 2, 1905.

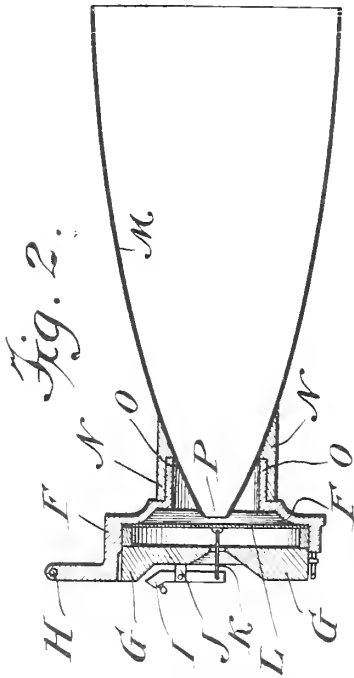


Fig. 2.

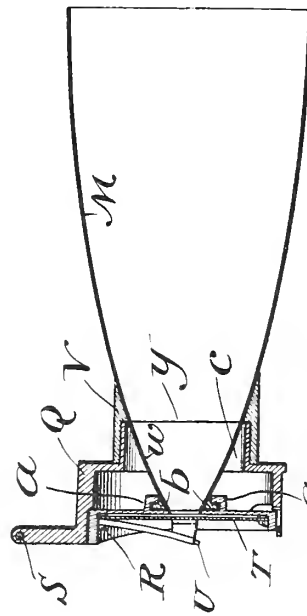


Fig. 3.

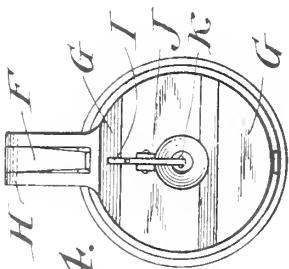


Fig. 4.

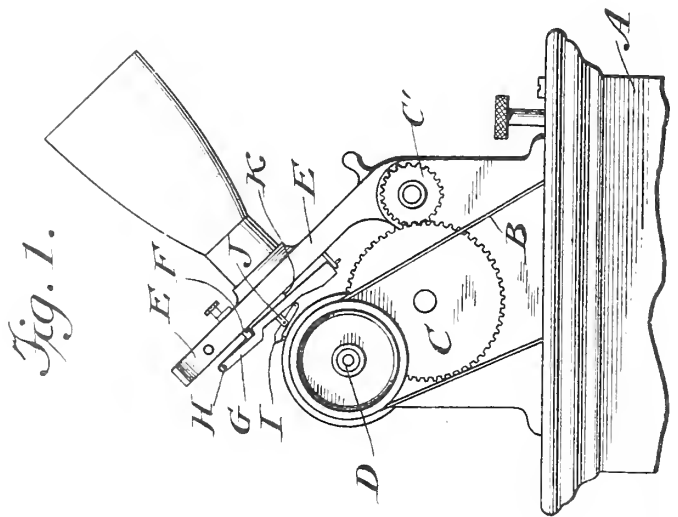


Fig. 1.

Witnesses
A. R. Appleman.
F. H. Durbach

Richard A. Anthony Inventor
 By *Phillips Abbott* his Attorney

UNITED STATES PATENT OFFICE.

RICHARD A. ANTHONY, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO ALBERT R. LEDOUX, OF CORNWALL-ON-THE-HUDSON, NEW YORK, AND ONE-HALF TO AMELIA V. V. ANTHONY, OF NEW YORK, N. Y.

SOUND-CONVEYING APPARATUS.

No. 804,995.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed March 2, 1905. Serial No. 248,046.

To all whom it may concern:

Be it known that I, RICHARD A. ANTHONY, a citizen of the United States, and a resident in the borough of Manhattan, city, county, and State of New York, have made certain new and useful Improvements in Sound-Conveying Apparatus, of which the following is a specification, reference being had to the accompanying drawings, in which—

10 Figure 1 illustrates an elevation of a so-called "talking-machine" of the cylinder type, embodying my invention, furnished with a "reproducer." Fig. 2 illustrates a vertical sectional view of a reproducer combined with my improved horn. Fig. 3 illustrates a vertical sectional view of a "recorder" combined with my improved horn. Fig. 4 illustrates a detail showing a face view of the reproducer.

15 My present invention relates to improvements and additions to that for which I filed an application for Letters Patent of the United States on the 20th day of October, 1904, said application being known as Serial No. 229,218, to which I refer for a general description of the physical laws governing that and likewise this present invention. The apparatus now to be described is adapted to a much larger range of use, attendant with much more extended and important results, than were attainable under my former invention, for which application for patent was filed as aforesaid.

20 Referring now to the drawings, A represents the box or casing containing the motor mechanism, &c., for the instrument. B is the usual belt or other power-transmitting mechanism. C C' represent the transmission-gear for the movement of the horn and coating parts. D is the shaft for the cylinder bearing the record, as is well understood. These parts are or may be of any preferred construction, and, as is well known in this art, a disk may be substituted for the cylinder, if desired, appropriate changes being made in certain of the parts.

25 E is the main traveling frame, which supports the recorder or reproducer, as the case may be. It also carries the horn, which, however, if large, is sometimes additionally supported at or near its outer end.

30 F (see Fig. 2) is the non-oscillating part of the diaphragm-frame.

G is the pivoted oscillating portion of the reproducer, its axis being shown at H.

I is the pivoted point-carrier, which is fulcrumed at J to the oscillating part G and which is at its other extremity provided with the link or transmitting-rod K, which is connected centrally with the diaphragm L, whereby the impulses are transmitted to the diaphragm at or near its center.

35 M is my improved horn. It is preferably, although not necessarily, made of metal, such as aluminium, silver, tin, copper, or other suitable metal. It is unimportant, however, so far as this invention is concerned, of what material the horn may be made. That which is of consequence is its interior contour—that is to say, it must be of such shape as that when the invention is used for making records the sound waves or vibrations entering the large mouth of the horn shall impinge upon its side and be deflected therefrom to its focus at or near the smaller end of the horn, on or near the ordinates of which focus the horn is truncated or cut off. This focal end of the horn is then placed as near the center of the diaphragm of the recorder as the oscillation or vibration of the diaphragm will permit, and the sound-waves will then be collected and concentrated upon the diaphragm, and likewise, *per contra*, when the invention is used for reproducing the sound-waves generated by the diaphragm will enter the horn at its truncated focal line and be projected forwardly and uniformly therefrom in the reverse direction from that in which the sound-waves would be received in record-making in a horn of the same shape.

40 Upon referring now to the drawings, it will be found that the apparatus above described has been therein illustrated. Fig. 2 shows the apparatus provided with a reproducer and is therefore adapted for projection. The horn M is in the instance illustrated shown as of paraboloid form. It may be ellipsoid, semi-ellipsoid, or hyperboloid, depending upon the special circumstances of its use, as will be fully understood by those familiar with the laws governing the deflection of sound. It is rigidly connected to an annular part N, which fits over a like part O on the frame F of the reproducer. It may be permanently attached

thereto by threads or otherwise, but preferably by slip-joint, as shown.

The focus of the horn is at P, and, as illustrated, it has been truncated on that line and the focus lies close to or on the diaphragm, a slight space, as shown, being provided to permit of vibration.

In Fig. 3 the record-making devices are illustrated in conjunction with my invention—that is to say, Q represents the stationary part of the recorder, coinciding with the part F of the reproducer, as shown in Fig. 2. R is the oscillatory part of the recorder, pivoted at S, which in this case carries the diaphragm T and the cutting-point U, which is suitably supported and attached at approximately the center of the diaphragm, as shown. The horn M is in this case also of paraboloid form, the same as shown in Fig. 2, and is attached to an annular cylindrical device V, which in all substantial respects is the same as the part N (shown in Fig. 1) and makes a slip-joint connection with the projecting cylindrical part of the non-oscillatory frame Q of the recorder. In this case, however, the terminal portion W of the horn is severed from the main body thereof on approximately the line Y, and this little terminal part is connected to the oscillating diaphragm-frame E by means of an underlying interlocking device, as follows: On the back of the frame is a two-angled annular structure *a*, and upon the sides of the cut-off terminal W of the horn near its truncated end or parameter is an annular curved projecting rib *b*, which interlocks with the two-angled annulus *a* in such manner that there is sufficient freedom of movement in the joint to permit the severed terminal W to slide forwardly and rearwardly in substantially the axial line of the horn as the diaphragm-frame oscillates, and to aid in this operation the interior cylindrical surface *c* is made of very slightly greater diameter than the exterior diameter of the severed terminal W at its larger end, (indicated by the line Y,) so that the lower arc of the severed terminal resting upon and guided by the said interior cylindrical surface will slide smoothly and evenly back and forth. In order that as little power as possible may be consumed in effecting this movement of the said terminal part, I prefer to make it of thin metal, if metal be employed.

It will be observed that the severed terminal W of the horn is truncated at or near its focal plane, the same as in the other case, and that the focus is located as nearly as practicable upon the diaphragm of the recorder.

The operation of the apparatus from what has already been stated is obvious. When the instrument is used for making the records, the sound-vibrations entering at the large open mouth of the horn impinge against its interior

surface and are deflected therefrom to its focus, where they are collected and concentrated, and since, as stated, this focus is placed in close proximity to the center of the diaphragm the impulses thus concentrated go directly thereto, resulting in the production of a well-defined clear good record adapted to reproduce with fidelity and clearness the sound-waves, tones, accents, &c., of the original. So, also, when the invention is used for reproducing (whether from a record made by the employment of my invention or otherwise) the reproduced sound or tone waves are thrown off from the diaphragm immediately at the focus of the horn and from the focus are projected against its interior walls and deflected therefrom outwardly from the mouth of the horn.

It will be obvious to those who are familiar with this art that modifications may be made in the detail of construction of the apparatus, whether the invention be employed for producing or record-making, without departing from the essentials of the invention. I therefore do not limit myself to such details. It will be obvious also that the essential element in the invention—*i. e.*, the horn the interior surface whereof diverges in curved lines from its axis and which is truncated at or near its focal plane—is adapted to beneficial employment in sound-conveying apparatus or devices generally.

I claim—

1. For the purpose stated a horn the interior surface whereof throughout its length diverges in curved lines from its axis and which is truncated at or near its focal plane and a diaphragm the center of which is substantially coincident in location with the focus of the horn.

2. In apparatus of the class stated a horn the interior surface whereof throughout its length diverges in curved lines from its axis and which is truncated at its focal plane, and a yieldingly-supported diaphragm combined together so that the focus of the horn and the face of the diaphragm are substantially coincident in location.

3. In apparatus of the class stated a horn the interior surface whereof throughout its length diverges in curved lines from its axis and which is truncated at its focal plane, and an oscillating diaphragm, the part of the horn in which the focal plane is located being attached to and moving with the diaphragm.

4. In apparatus of the class stated a horn the interior surface whereof throughout its length diverges in curved lines from its axis and which is truncated at its focal plane and an oscillating diaphragm, the part of the horn in which the diaphragm is located being detached from the rest of the horn and adjustably connected with the diaphragm, so as to

automatically adjust itself relative to the axis of the horn as the diaphragm oscillates.

5 In apparatus of the class stated a horn the interior surface whereof throughout its length diverges in curved lines from its axis and which is truncated at its focal plane and a diaphragm having materially greater diameter than the truncated end of the horn, the two being combined together so that the focus

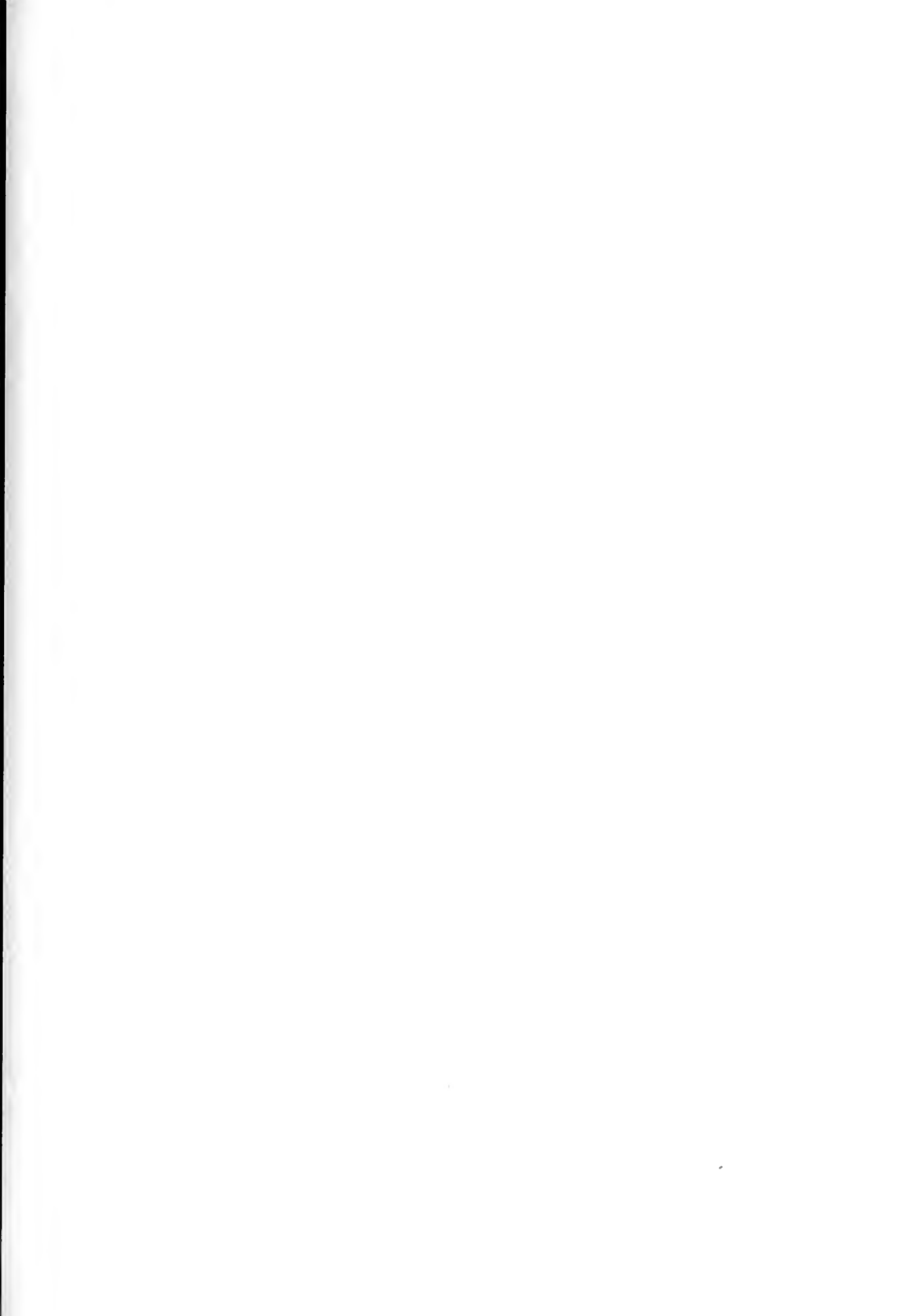
of the horn and the center of the diaphragm are substantially coincident in location. 10

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD A. ANTHONY

Witnesses:

F. M. DOUSBACH,
LOUIS LAZAROWITZ.



No. 805,011.

PATENTED NOV. 21, 1905.

G. W. GOMBER.
MANDREL.

APPLICATION FILED MAR. 23, 1905.

3 SHEETS—SHEET 1.

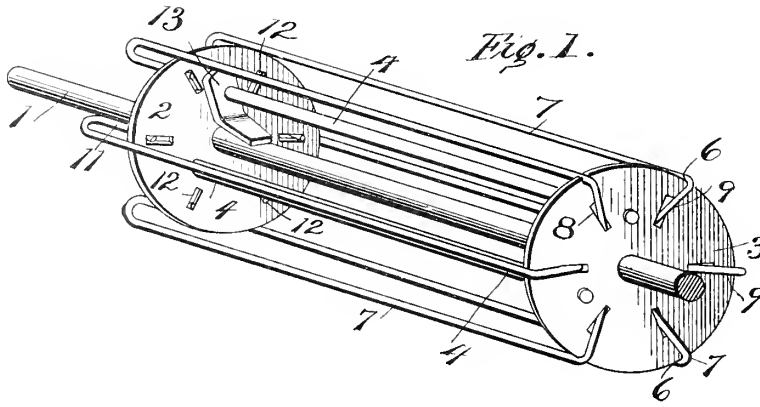


Fig. 1.

Fig. 2.

Fig. 3.

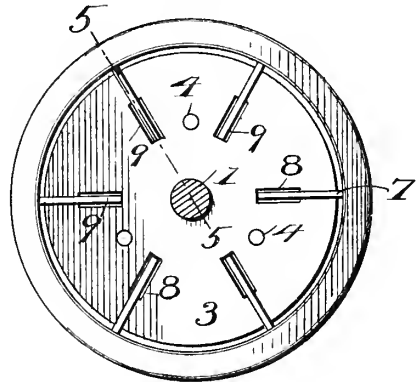
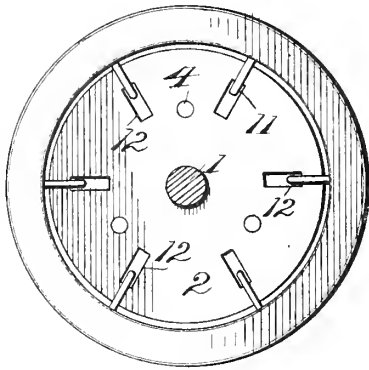


Fig. 4.

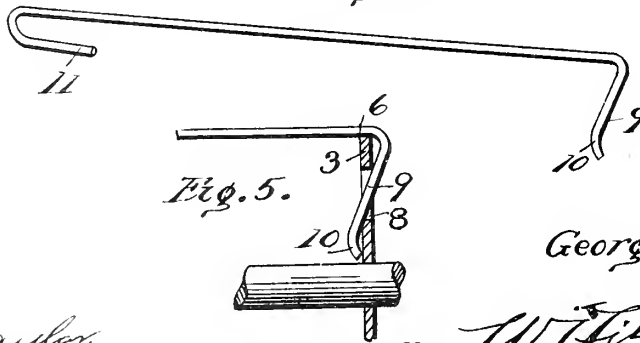
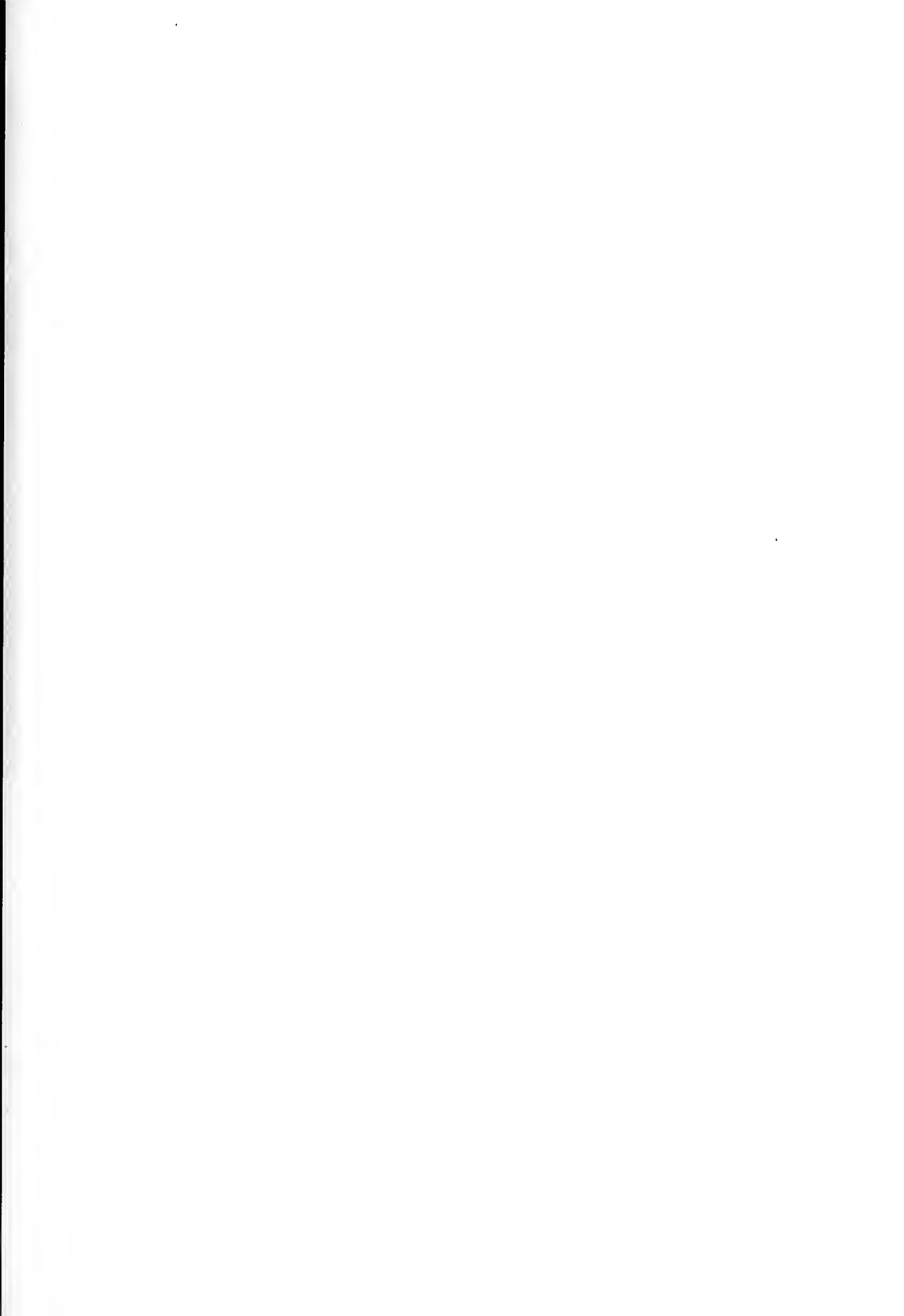


Fig. 5.

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3 SHEETS—SHEET 2.

Fig. 6.

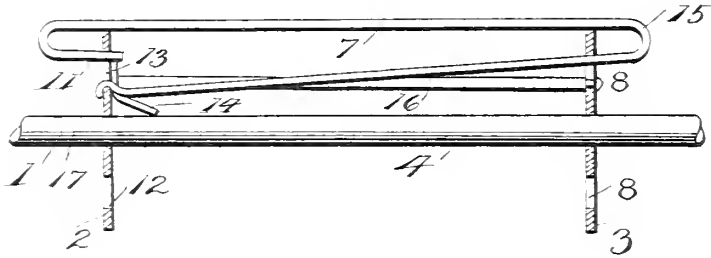


Fig. 7.

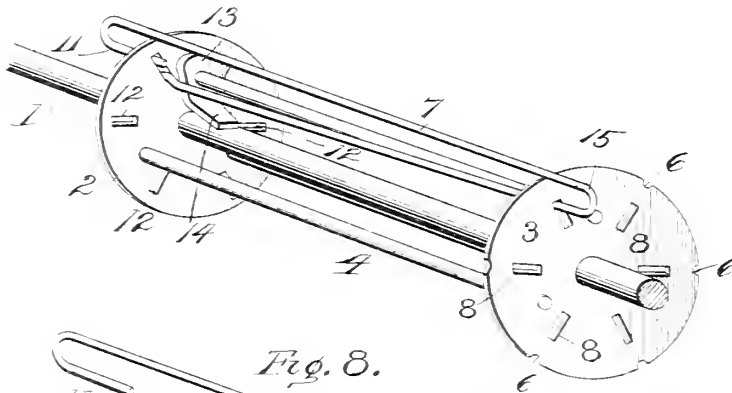


Fig. 8.

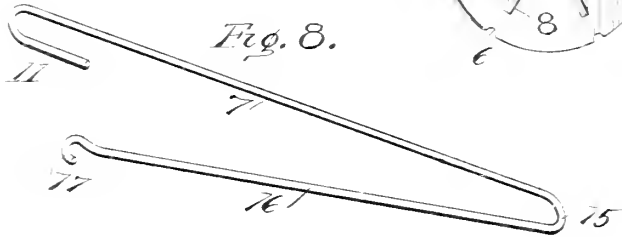
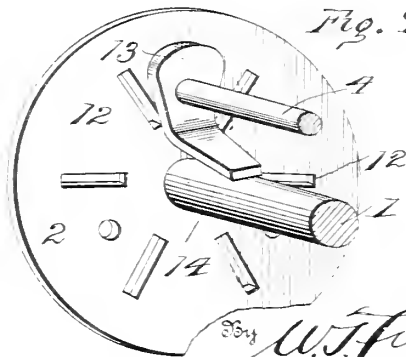


Fig. 9.



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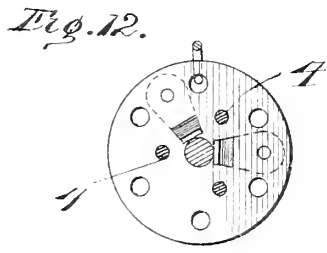
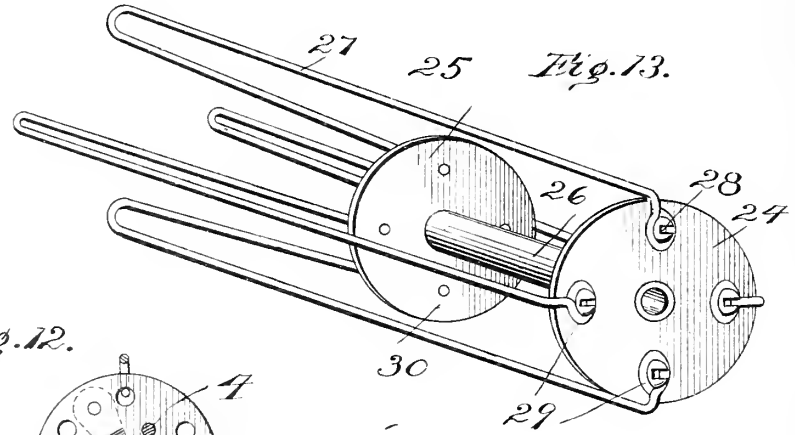
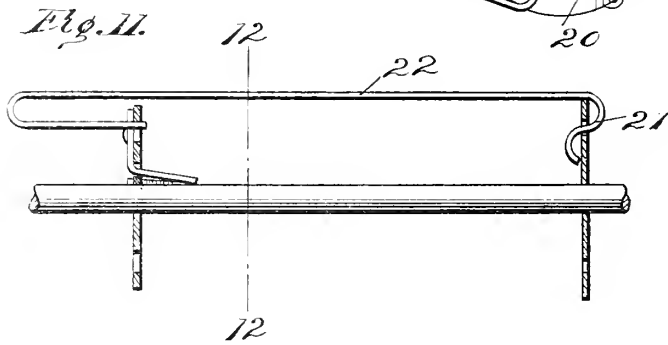
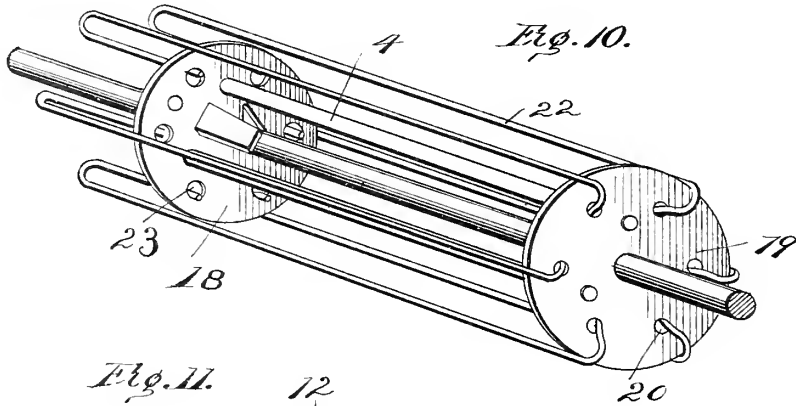


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MANDREL.

APPLICATION FILED MAR. 23, 1905.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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HULDA GOMBER, OF CONYNGHAM, PENNSYLVANIA.

MANDREL.

No. 805,011.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed March 23, 1905. Serial No. 251,664.

To all whom it may concern:

Be it known that I, GEORGE W. GOMBER, a citizen of the United States, residing at Conyngham, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Mandrels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to mandrel construction; and my object is to provide a tablet-holding mandrel for talking-machines of that variety wherein a cylindrical tablet is employed to carry the record.

The device is substantially similar to that described and claimed by me in an application filed on September 20, 1901, Serial No. 75,919; in a renewal application filed by me on May 28, 1903, Serial No. 159,213, and in an application filed on January 14, 1904, Serial No. 189,058.

The essential feature of novelty involved in my invention is the provision of a reliable supporting medium for the tablet, the parts of which are so constructed and combined as to yieldingly receive the mandrel until the latter is forced home thereon and at the same time afford a positive or unyielding form of support for the tablet and truly center the same around the axial plane of the mandrel-shaft.

Other objects and advantages will be hereinafter clearly set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my invention complete ready for use, showing part of the supporting-shaft or axle therefor. Fig. 2 is an end view of my improved tablet-mandrel, showing the tablet in position thereon, said view being taken from the left side of Fig. 1. Fig. 3 shows the opposite end of my mandrel from that presented in Fig. 2. Fig. 4 is a view in perspective of one of the spring-arms of my mandrel removed. Fig. 5 is a sectional view of part of my mandrel, taken on line 5 5 of Fig. 3. Figs. 6, 7, and 8 show a modified form of construction. Fig. 9 shows a perspective view of centering-disk or end section. Fig. 10 is a perspective view of another modified form of construction. Fig. 11 is a section through a portion of said modification. Fig. 12 is a section on line 12 12,

Fig. 11; and Fig. 13 is a perspective view of another modified form.

Referring to the numerals of the drawings, 1 indicates the axle or mandrel-shaft, the mandrel proper being adjustably mounted thereon, as will be hereinafter more clearly specified.

What may be termed the "body portion" of my improved mandrel comprises the end sections 2 and 3, held in permanent relationship to each other in any preferred way, as by being rigidly secured to the ends of the rods 4, it being understood that any preferred number of said rods may be employed to insure that the said end sections will be permanently united. Each of said end sections is substantially disk-like in form, being readily blanked out of any suitable variety of sheet metal. The section 3 is designed as the inner or larger end of the mandrel in cases where the mandrel is conical in form and is provided at regular intervals with the notches 6, designed to receive a contiguous part of the radially-disposed spring arms or members 7. My purpose is to connect each of the spring-arms 7 to the inner end section 3, so that the outer ends thereof will rest against the periphery of the end section 2 when the tablet is placed thereon. Obviously the spring members 7 may be connected in a great variety of ways to the inner end section 3 and may be limited in the movement of their free ends by any preferred devices which will place each of the free ends in connection with the outer end disk, and the following-described construction is therefore representative of any preferred means which may be employed to secure and hold the spring-arms in proper cooperative relationship to both of the end sections. It will be observed that the inner end section 3 is provided with a plurality of radially-disposed slots 8, located equidistant from each other and from the central aperture in which the shaft 1 is disposed, the office of said slots being to receive the inwardly-directed angular branch or extension 9, the length of said extension being sufficient to dispose the extreme end or terminal 10 directly against the inner face of the disk 3 at a point between the inner end of the slotted opening 8 and the diametrical shaft-receiving aperture, as more clearly illustrated in Fig. 4. The opposite or free end of each of the spring-arms or expandible members 7 is of sufficient length to

extend beyond the end section 2, said free end being bent upon itself to provide the inwardly-directed finger or branch 11, the extreme inner end of which is adapted to enter and play within one of the radial slots 12, formed in the end section 2 near the outer edge thereof. It therefore follows that when the fingers 11 are entered each in its respective slot 12 the outer ends of the expansible or spring members 7 will be circumscribed in their outer movement. It is further obvious that the inner movement of each of the expansible or spring members 7 will be controlled or limited by contacting with the periphery of the end sections 2, and since the aperture provided for the shaft 1 in the end section 2 is truly concentric with the periphery thereof all of the outer ends of the spring members 7 will, when brought in contact with the edge of the end section 2, be disposed in the same circumferential plane extending around the axial plane, thereby insuring that the tablet upon the mandrel will also be concentric with said axial plane. It may be stated that the inner bore of a tablet as now commonly constructed is slightly conical, and I further compensate for this formation by forming the inner end section 3 of slightly greater diameter than the outer end section 2, though it is obvious that this arrangement may be reversed or both of the end sections may be made the same in size.

Any suitable means may be provided for removably securing my mandrel in position upon the shaft, as a simple form of spring member 13, secured to one of the end sections and provided with an extension 14, the extreme end of which is adapted to engage and bear against a contiguous part of the shaft 1, as fully illustrated in Fig. 1 and other views.

In illustration of the fact that the expansible spring members 7 may be variously shaped and secured in coöperative relationship with the end sections 2 and 3 attention is called to Figs. 6, 7, 8, and 9, wherein it will be observed that the spring members 7, which are designed to directly engage the inner face of the bore of the tablets, are formed of a longer section of spring-wire than is employed in forming the spring-arm illustrated in Fig. 4, such wire being bent upon itself, as indicated by the numeral 15, the section 7 being designed to rest in one of the recesses 6, while the extension 16 is passed through one of the slots 8 in the end section 3, while the extreme end of the section 16 is provided with a hook-like terminal 17, which latter is designed to be passed through the slot 12 in the outer end section 2, said hook engaging the extreme inner end of said slot, thereby leaving sufficient room for free play of the finger 11 in the outer portion of the slot, said finger being designed, as hereinbefore stated, to limit the outward movement of the outer

end of the expansible member or spring-arm 7. The office performed by the hook-terminal 17 is obviously to prevent a casual inward movement of the spring-arms 7 relative to the end sections of the mandrel. It will thus be apparent that only the spring-arms of my mandrel will come in contact with the tablet, inasmuch as the recesses 6 are only of sufficient depth to hold said arms in proper position relative to the periphery of the end section 3, there preferably being no recesses upon the end section 2. By thus providing means to set up a frictional engagement between my mandrel and its supporting-shaft 1, in this instance consisting of a tension-finger 14, my mandrel, it is obvious, may be readily moved longitudinally in either direction upon its concentrically-disposed supporting-shaft, so as to dispose the tablet upon the mandrel in true relation to the recorder or reproducer, an important and valuable desideratum, inasmuch as some records are started very near the end of the tablet, while others are started a considerable distance from the end, and as the point of beginning of the record is very clear the operator may quickly dispose the tablet at the proper point and insure that no appreciable interim of rotation of the tablet will follow before reproduction of the record begins.

By reference to Figs. 1, 2, and 6 of the drawings it will be observed that the outer ends of the expansible members 7 normally lie out of contact with the periphery of the outer end section, thus permitting a slight inward movement of each of said expansible members incident to the placing of the tablet in position upon my mandrel, and, as before stated, when the expansible members are thus moved inward they will all be disposed the same distance away from the center of the mandrel and insure that the tablet upon the mandrel will be truly or concentrically rotated. It will thus be obvious that a tablet may be quickly disposed upon or removed from my improved mandrel and that since the tablet is engaged only at certain points all liability of cracking and consequent destruction of the tablet incident to the contraction and expansion of the mandrel or tablet is wholly removed. My improved mandrel will therefore be found to be absolutely safe for use in connection with a tablet of the most delicate or fragile character, and, moreover, the mandrel, with the tablet thereon, may be bodily and longitudinally moved to attain a perfect adjustment.

It will be understood that the relative size of the end sections 2 and 3 will determine the character or size of the cone-shaped mandrel and that when the free ends of all of the spring members 7 are pressed inward against the outer edge of the disk or end section 2 said spring members will be disposed so as to present a cone-like receiver or mandrel for

the conical bore of the tablet. It is obvious, however, that should it be desirable to have a tablet with a cylindrical bore instead of having said bore conical in form, as is now
 5 common, then the end sections 2 and 3 should be substantially the same size, and the tablet will thus be held in place by means of the tensile property of said spring mem-
 10 bers. In the use of tablets having a conical bore it is of course important to form the disk sections 2 and 3 so that a true cone will be produced when all of the free ends of the
 15 spring members are forced inward against the contiguous edge of the smaller disk, thereby positively seating the free end of each spring member in a secure and reliable
 20 manner, and thereby holding both ends of the tablet in a position that will be true with respect to the axis of the mandrel.

The parts of my mandrel, it will be observed, may each be readily manufactured or formed, as by the simple operation of stamping or bending, and said parts quickly assembled each in its respective operative position,
 25 and while I have described the preferred construction and combination of parts I desire to comprehend such substantial equivalents and substitutes as may be regarded as falling fairly within the scope of my invention.

Among these other modifications are those illustrated in Figs. 10 to 13. The construction shown in Figs. 10, 11, and 12 consists of end disks 18 and 19, which are permanently
 30 connected by rods 4, placed at suitable intervals. Circular apertures 20 are formed within disk 19 and receive S-shaped extensions 21 of spring-arms 22. The ends of the extensions 21 bear on the inner face of disk 19. The other ends of the rods 22 are U-shaped
 35 and extend beyond disk 18. These U-shaped portions loosely engage apertures 23, formed in disk 18. By reason of the peculiar formation of extensions 21 the same force their arms 22 laterally, so that they are held normally spread apart. In view of the fact,
 40 however, that the U-shaped portions of the arms are fitted loosely within apertures 23 said arms can be partly contracted when a tablet is placed upon the mandrel. In Fig.

13 I have shown end disks 24 and 25 connected by a sleeve 26, adapted to receive the mandrel-shaft. Spring-arms 27 are secured to disk 24 by means of screws 28 entering eyes 29, and these spring-arms extend a considerable distance past disk 25 and are recurved, the ends thereof projecting through apertures 30 in disk 25 and being capable of moving longitudinally therein. Arms 25 are normally spread apart, but can be drawn together by contracting the recurved portions thereof.

What I claim as new, and desire to secure by Letters Patent, is—

1. A tablet-mandrel comprising suitable

end sections, means to secure said sections in
 65 operative relationship, in combination with a plurality of spring-like tablet-engaging devices properly secured to the inner end section and limited in their inner and outer
 70 movements by devices carried by the outer end section and cooperating with the free end of said spring, all combined substantially as specified and for the purpose set forth.

2. A tablet-mandrel comprising a disk-like inner and outer end section, devices adapted to
 75 operatively secure said sections in permanent relationship with each other, a plurality of radially-disposed spring members 7 carried by the inner end section and extending into engagement with the outer end section,
 80 all combined substantially as specified and for the purpose set forth.

3. In tablet-mandrels, the combination with a suitable shaft of a pair of disk-like end sections, a rod or rods firmly connecting said
 85 disks together and holding them in permanent union, a plurality of tablet-engaging members 7, means to secure the inner ends of said members rigidly in union with the inner disk-like end section and additional means to
 90 so connect the outer end of each of said members with the outer disks, the said outer ends will be free to move inward when the tablet is disposed over them, all substantially as specified and for the purpose set forth.

4. The herein-described tablet-mandrel comprising a pair of disk-like end sections 2 and 3 having a central aperture designed to receive the actuating-shaft, a clamping-spring 15 carried by one or both of said end sections, in combination with a plurality of rods 4 rigidly connecting the end sections together, a plurality of tablet-engaging spring members 7 each bent upon itself to provide the inwardly-directed branch 10 adapted to
 100 take through a slot 9 in the inner disk, and each having upon its free end a hook 12 designed to reach through and engage the lower edge of its individual slot 11 provided in the outer head, each spring member 7 also hav-
 105 ing an anchoring-terminal 14 formed by bending the free end of the main section upon itself to provide the loop 13, said terminal being designed to also reach into engagement with the slot 11 and thereby limit the outer travel of the spring though permitting a free inward movement thereof when the tablet is disposed in position, all combined substantially as specified and for the purpose set forth.

5. A tablet-mandrel comprising suitable end sections, means to secure said sections in
 110 operative relationship, in combination with a plurality of tablet-engaging devices properly secured to one of said end sections, said tablet-engaging devices being limited at their free ends in their inner and outer movements
 115 by the outer end section.

6. A mandrel having suitable end sections, and elastic connecting devices engaging the end sections.

5 7. A mandrel having suitable end sections, and elastic connecting devices engaging the end sections and bodily movable at all points therebetween.

10 8. A mandrel having suitable end sections and expansible devices carried by one end section and limited in their inner and outer movement by the other end section, as set forth.

15 9. A mandrel comprising a plurality of spring-arms carried by one end, and suitable means at the other end adapted to seat the free ends of said arms whereby they will be limited in their inner movement and when seated will lie in common circle having its center in the axial plane of the mandrel, substantially as specified and for the purpose set forth.

25 10. A mandrel having at one end a plurality of tablet-engaging devices and provided with means at the other end to limit the inner movement of the free ends of said devices, whereby said free ends when moved inward will find a common radius around the axial plane of the mandrel, as set forth.

30 11. A mandrel having a plurality of tablet-engaging spring-arms and also having means to limit the inward movement of said arms whereby they will all be seated equidistant from the axial plane of the mandrel as set forth.

35 12. A mandrel for talking-machines adapted to hold a tablet in true coöperative rela-

tion with the recorder or reproducer, said mandrel comprising a plurality of spring-arms adapted to enter the bore of the tablet, and a centering device for both ends of said arms for disposing both the inner and outer ends equidistant around a common center, as and for the purpose set forth. 40

13. A mandrel having a plurality of elastic tablet-receiving devices secured at one end, and means adapted to dispose said devices around a common center when the mandrel is seated. 45

14. A mandrel having suitable end sections, and elastic connecting devices engaging the end sections and adapted to move bodily along lines radiating from the center of the mandrel. 50

15. A mandrel having suitable end sections and bodily-movable devices carried by one end section and limited in their inner and outer movement by the other end section. 55

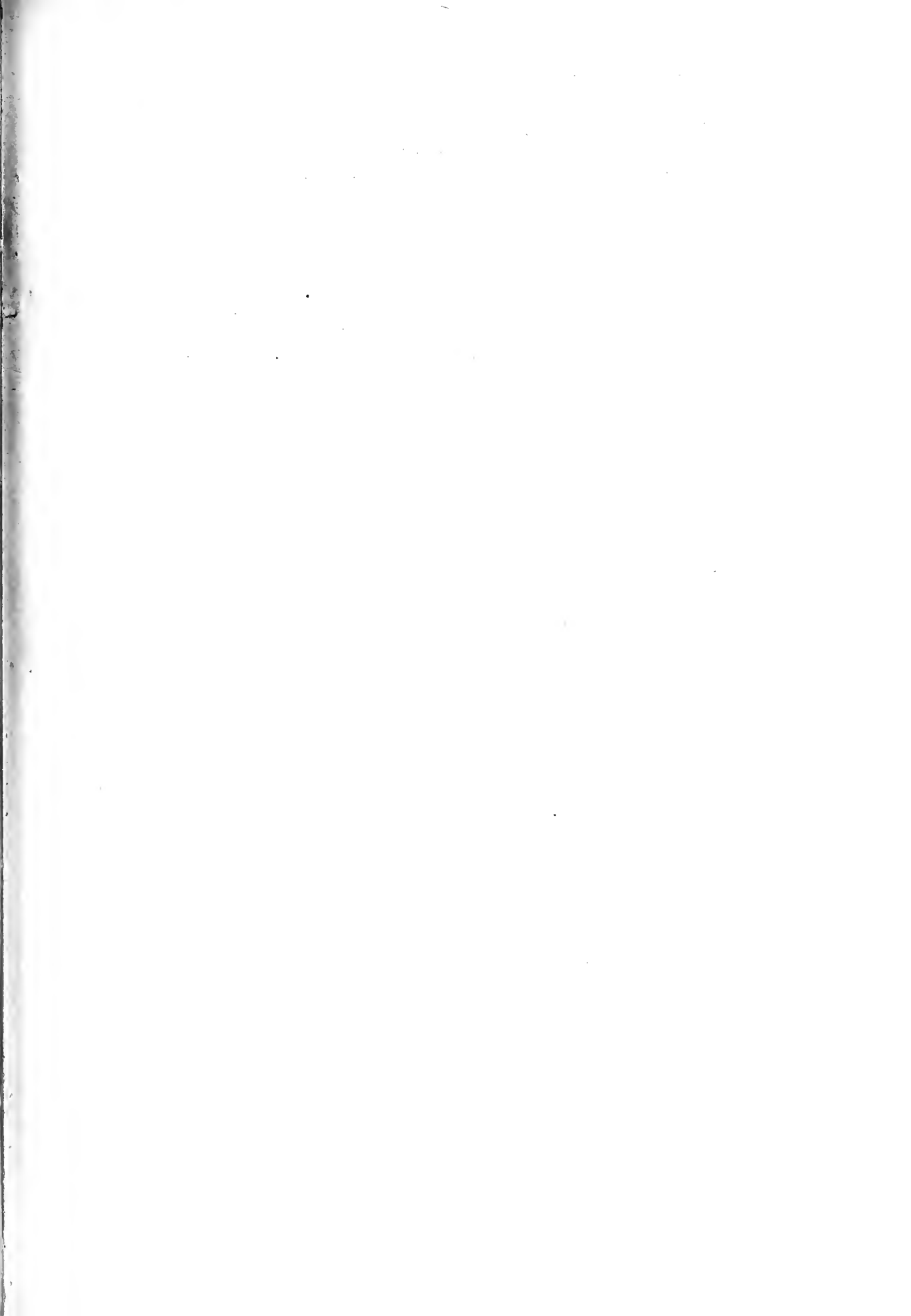
16. A mandrel comprising a plurality of bodily-movable spring-arms carried by one end, and suitable means at the other end adapted to seat the free ends of said arms whereby they will be limited in their inner movement and when seated will lie in a common circle having its center in the axial plane of the mandrel. 60 65

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

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Witnesses:

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ERVIN GOMBER.



S. KERSHAW.

REPEATING ATTACHMENT FOR TALKING MACHINES.

APPLICATION FILED JAN. 31, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

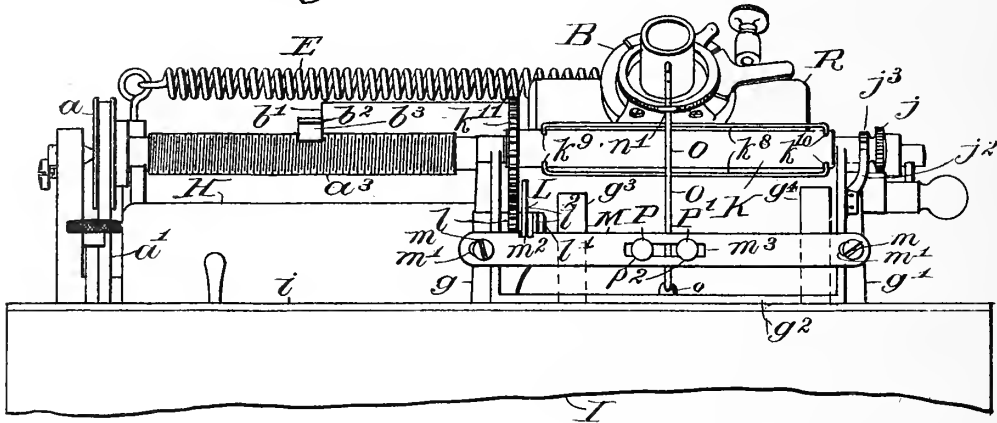


Fig. 2.

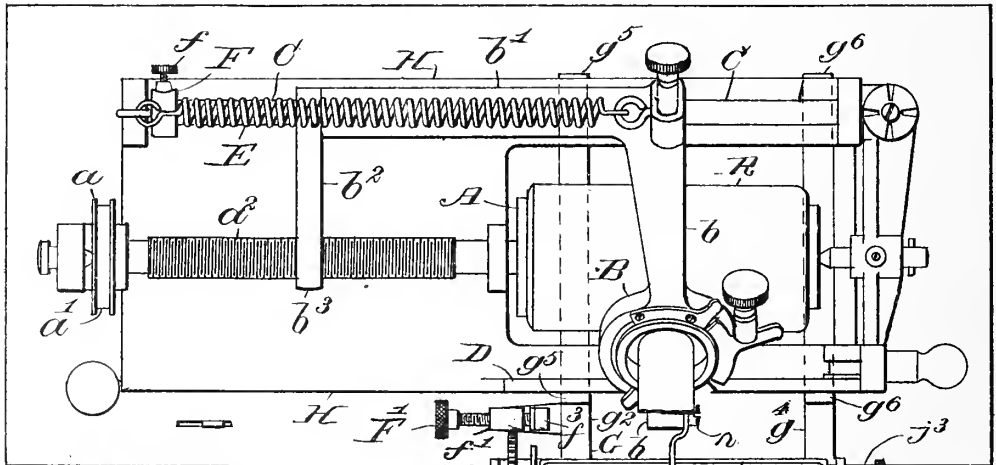
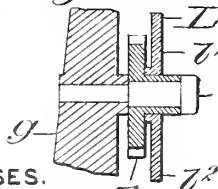


Fig. 3.



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REPEATING ATTACHMENT FOR TALKING MACHINES.

APPLICATION FILED JAN. 31, 1905.

2 SHEETS—SHEET 2.

Fig. 4.

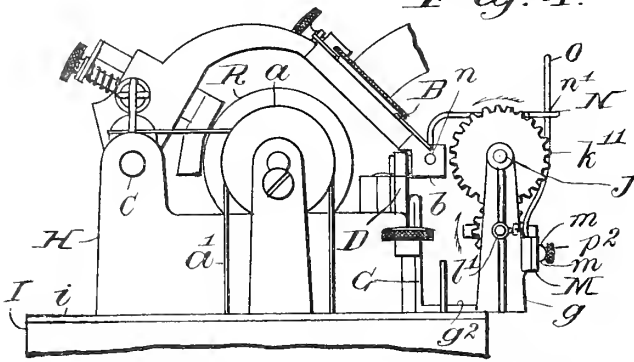
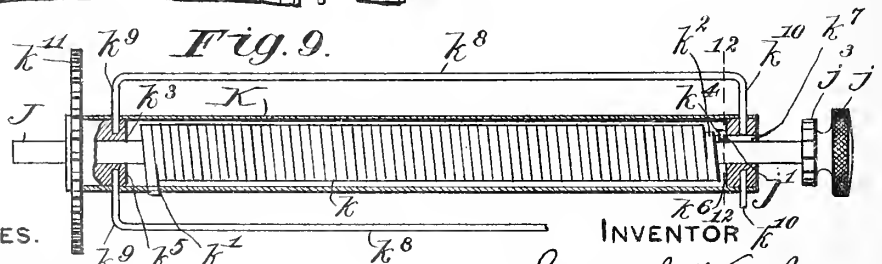
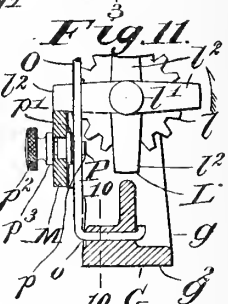
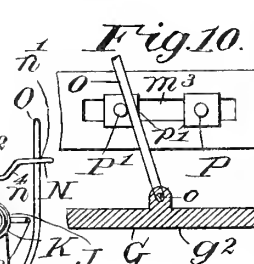
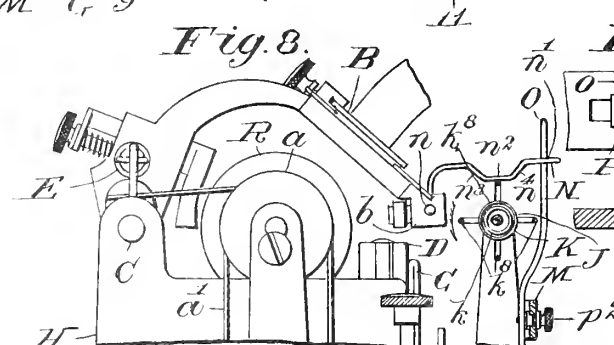
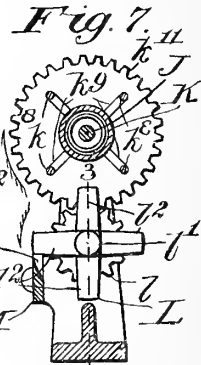
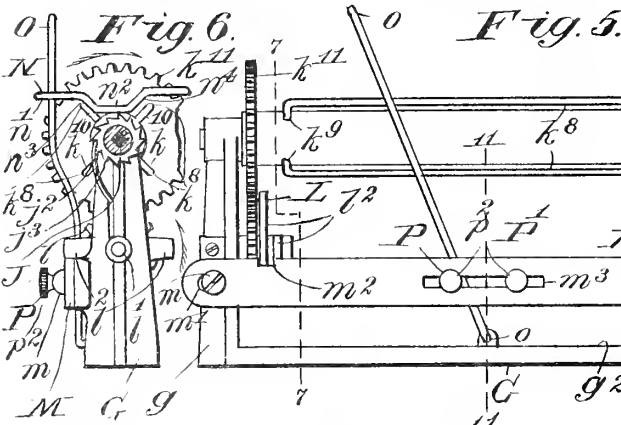
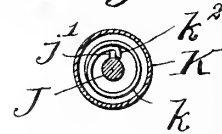


Fig. 12.



WITNESSES.

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By Albert M. Moore,
His ATTORNEY.

UNITED STATES PATENT OFFICE.

SAMUEL KERSHAW, OF LOWELL, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO THOMAS WARDELL, OF LOWELL, MASSACHUSETTS.

REPEATING ATTACHMENT FOR TALKING-MACHINES.

No. 805,076.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed January 31, 1905. Serial No. 243,556.

To all whom it may concern:

Be it known that I, SAMUEL KERSHAW, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Repeating Attachments for Talking-Machines, of which the following is a specification.

This invention relates to repeating attachments for talking-machines, such as phonographs and graphophones.

The object of this invention is to return the speaker or reproducer instantly to the starting-point of the record after each reproduction of the record until the motive power is exhausted or until the motor is stopped by the usual means in order to give a continuous reproduction of a musical record to accompany dancing, marching, or other rhythmical movements of the body or limbs.

The improvement herein described allows the beginning and ending of the reproduction to be made at any desired points on the record, so that, if desired, the usual "announcement" at the beginning of the record may be omitted in the repetition, or any desired part of the record may be used alone.

Other devices which return the reproducer to the starting-point are coin-controlled and do not repeat the record until another coin is placed in the coin-slot or else occupy too much time in making such return to allow of their being used for any purpose that requires a practically continuous performance. Such devices are usually a part of the machine and built into the same frame with the other parts, the whole constituting a special machine capable of no other use.

The attachment herein described is easily separable from the talking-machine and does not prevent the ordinary uses of the latter.

In the accompanying drawings, on two sheets, Figures 1 and 2 are respectively a front elevation and a plan of a phonograph with my improved attachment applied thereto; Fig. 3, a vertical transverse section on the line 3 3 in Fig. 7 of a part of the attachment-frame, the escapement, and the pinion rotary therewith; Fig. 4, a left-end elevation of the phonograph and my attachment; Fig. 5, a front elevation of said attachment; Fig. 6, a vertical section on the line 6 6 in Fig. 5 of the spring-winding spindle, showing a right-end elevation of the other parts of the attach-

ment; Fig. 7, a vertical section on the line 7 7 in Fig. 5 from front to rear of said attachment; Fig. 8, a left-end elevation of the upper part of the phonograph and of the attachment, showing the reproducing-arm of the phonograph raised by the lifter; Fig. 9, the lifter, partly in central longitudinal section, showing in plan the spindle, spring, and gear fast on the lifter; Fig. 10, a longitudinal vertical section on the line 10 10 in Fig. 11 of a part of the frame of the attachment, showing in rear elevation parts of the sliding bar and lever of the escapement; Fig. 11, a vertical transverse section of a part of the attachment-frame on the line 11 11 in Fig. 5, showing parts of the escapement; Fig. 12, a vertical section on the line 12 12 in Fig. 9 of the barrel and spindle and a left-end elevation of the lifter-spring.

The phonograph is represented as having a mandrel A, provided with a fast pulley a , adapted to be connected by a belt a' to any suitable motor. The mandrel supports a record R and has a screw a^2 , the revolution of which causes a diaphragm or reproducer B to travel lengthwise of said record, said reproducer being secured to the reproducer-arm b of a tubular carrier b' , which slides on a guide-rod C and has another arm b^2 , the free end of which supports a nut b^3 , which rests upon the screw a^2 when the phonograph is in operation, the front or free end of the reproducer-arm being then supported by a straight edge D, which is parallel with the axis of the mandrel A and with the guide-rod C. The above-named parts are of the usual construction and operation.

To return the diaphragm or reproducer to the starting-point, the front end of the reproducer-arm is lifted and pushed to the left in Figs. 1 and 2, the raising of said arm raising the nut b^3 out of engagement with the screw a^2 and then replaced upon the straight edge D, causing said nut to reengage said screw.

To return the diaphragm to the starting-point, I use a spring E or equivalent device, the same being represented as a spiral spring connecting the carrier b' with a part of the phonograph-frame at the left of said carrier, so that said spring is stretched by the feed movement of the carrier and draws said carrier back in a second or less time, when the reproducer-arm is raised and supported, as hereinafter described.

It is important that the carrier should return to the exact point desired in order that the reproducing-point of the diaphragm may engage exactly the beginning of the record or the beginning of the part to be repeated. I use a stop, which may be a collar F, surrounding the guide-rod C and held at any desired point by a radial set-screw f , which turns in said collar against said rod, as shown in Figs. 1 and 2; but I prefer to use an arm or post f' , supported on the frame G of the attachment, Fig. 2, in which post turns a horizontal screw F', the point of which carries a buffer f^3 , of felt, leather, rubber, or similar material, against which the reproducer-arm b may strike in the return movement of the carrier b' , the last-named device being more easily and accurately adjustable and being removable with said attachment-frame. The frame G of the attachment consists of two posts $g g'$, connected by a suitable base g^2 . When the attachment is in use, it may be secured to the base H or frame of the phonograph in any convenient manner. In Figs. 1, 2, 4, and 8 the frame G is represented as provided with arms $g^3 g^4$, each of which extends to the back of the base H and has two upward projections $g^5 g^6$, arranged at a suitable distance apart to receive between them said base H, so that the weight of the phonograph will hold the attachment steadily in place on the table i or top of the motor-case I. A horizontal spindle J is journaled in the posts $g g'$ and may be turned by grasping and turning a milled head j secured thereto.

The lifter, which raises the reproducer at the end of the reproduction and disengages the nut from the screw, comprises a barrel or hollow cylinder K, rotary on the spindle J, a helical spring k , arranged in said barrel and having one end secured to said barrel at k' , and having at the other end a hook k^2 , which engages a projection j' on the side of the spindle J. The spindle J, Figs. 9 and 12, passes through central holes $k^3 k^4$ in heads $k^5 k^6$ of the barrel K, the head k^6 nearest the head j having a radial slot k^7 to allow the projection j' to pass through said head k^6 and engage the hook k^2 . When the spindle is turned to wind up the spring k , said spindle is prevented from turning in the opposite direction by a spring-retaining pawl j^2 on the post g' , which engages a ratchet-wheel j^3 , fast on said spindle. The barrel K is long enough to fill the space between the posts $g g'$ without binding. The barrel K is provided with a plurality (four are shown) of rests k^8 , arranged at equal angular intervals from each other, each having a straight edge or surface, on which an extension N (hereinafter described) of the reproducer-arm b may slide to the starting-point when said arm is raised. These rests are represented as each formed of a single wire, the body of which is parallel with the axis of said cylinder, the end portions of said wire being

bent at right angles at $k^9 k^{10}$ and driven radially into the heads $k^5 k^6$ of the barrel K. A gear k^{11} is fast on the barrel K, concentrically therewith, and engages a pinion l , which turns on a horizontal stud l' , secured to the post g . Rotary with the pinion l is a spider L, having as many arms l^2 as there are rests k^8 on said barrel, said arms l^2 being of an even number and the opposite arms lying in the same plane with each other, but in a different plane from the next arms, or, at least, the free ends of successive arms lie in two different planes, the alternate free ends in the same plane. The unwinding of the spring k tends to turn the cylinder K, gear k^{11} , pinion l , and spider L in the directions indicated by adjacent arrows.

A bar M is arranged to slide on studs or screws m , which pass through slots m' in said bar into the posts $g g'$, the length of said slots limiting the movement of said bar. Said bar M is provided with a notch m^2 on its upper edge of a width and depth sufficient to allow the free end of one of said arms l^2 to pass freely through said notch, and the sliding of said bar in one direction brings said notch into position to allow the arms l^2 of one plane to pass down through it; but immediately after one of said arms passes through said notch the next-following arm being in another plane strikes the top of said bar outside of said notch and prevents the further rotation of said spider and of the pinion, gear k^{11} , and barrel K. When said bar M is pushed in the other direction, the arm resting on said bar passes down through said notch and the following arm strikes on the top of said bar. As represented, the pinion l has half as many teeth as the gear k^{11} , so that every time one of the four arms l^2 passes through the notch m^2 the barrel makes one-eighth of a revolution. The bar M and the spider L thus form an escapement.

To the reproducer-arm b I attach an extension N by any convenient means, as by the cap-screw n , Fig. 2, said extension consisting of a rod or wire having at its front end a loop n' , and a lever O, pivoted at o on the base g of the frame G, extends up through said loop n' and is swung alternately in one and the other direction by the operative and return movements of the reproducer. The lever O swings between two studs P P', which are adjustable in the horizontal slot m^3 of the escapement-bar M, each stud consisting, Fig. 11, of a pin p , arranged in said slot and having a flange p' between its ends and a nut p^2 , also provided with a flange p^3 , so that when the nut is turned on the threaded front end portion of said pin the bar M is pinched between the two flanges and the pin is prevented from moving on said bar. The part of the pin p within the slot m^3 is preferably rectangular and fills said slot vertically to prevent said pin from turning in said slot. The extension N is bent downward between its ends

to form a horizontal bearing n^2 upon a rest k^8 of the barrel K when said rest is in a vertical position, Fig. 8, and at the ends of the bearing n^2 are inclines $n^3 n^4$ to insure the lifting and lowering of said extension without jar by the rests.

When the studs P P' are properly adjusted and the moving diaphragm has reached the end of the record, the lever O strikes the stud P' and moves the escapement-bar to the right, allowing one arm of the spider or scape-wheel L to pass through the notch m^2 , and the barrel turns enough to bring a rest k^8 vertically under the extension N, raising the reproducer-arm b and lifting the nut b^3 out of the screw a^2 , whereupon the spring E instantly draws the reproducer-carrier back to the starting-point, and at the same time the lever O, striking the stud P, throws the bar M to the left and allows another eighth of a revolution of the barrel, letting the reproducer-arm b fall and said nut b^3 again to engage said screw a^2 .

I claim as my invention—

1. The combination of a barrel having rests or parallel straight edges arranged at equal angular distances from each other, means of turning said barrel on its axis, a scape-wheel driven by said barrel and adapted to permit at each operation of said wheel the turning of said barrel an angular distance measuring one-half of the angular distance between adjacent rests, a release or escape piece, connecting means arranged to be moved by the operative movement of the reproducer-arm of a talking-machine, to release said wheel and to effect the movement of said barrel and the raising of said arm, with said arm and means for producing said operative movement thereof.

2. The combination of a barrel having rests or parallel straight edges arranged at equal angular distances from each other, means of turning said barrel on its axis, a scape-wheel driven by said barrel and adapted to permit at each operation of said wheel the turning of said barrel an angular distance measuring one-half of the angular distance between adjacent rests, a release or escape piece, connecting means arranged to be moved by the return movement of the reproducer-arm of a talking-

machine, to release said wheel and to permit the movement of said barrel and the lowering of said arm, with said arm and means for producing said return movement thereof.

3. The combination of a barrel having rests or parallel straight edges arranged at equal angular distances from each other, means of turning said barrel on its axis, a scape-wheel driven by said barrel and adapted to permit at each operation of said wheel the turning of said barrel an angular distance measuring one-half of the angular distance between adjacent rests, a release or escape piece, a lever arranged to be moved by the operative movement of the reproducer-arm of a talking-machine, to release said wheel and to effect the movement of said barrel and the raising of said arm.

4. The combination of a barrel having rests or parallel straight edges arranged at equal angular distances from each other, means of turning said barrel on its axis, a scape-wheel driven by said barrel and adapted to permit at each operation of said wheel the turning of said barrel an angular distance measuring one-half of the angular distance between adjacent rests, a release or escape piece, a lever arranged to be moved by the return movement of the reproducer-arm of a talking-machine, to release said wheel and to permit the movement of said barrel and the lowering of said arm.

5. The combination of a barrel provided with projecting straight edges parallel with the axis of said barrel and at equal angular intervals from each other, means of rotating said barrel, a scape-wheel, an escapement-piece, connecting means between said escapement-piece and the reproducer-arm of a talking-machine and adjusting devices whereby a movement of said arm a predetermined distance in either direction will release said escapement.

In testimony whereof I have affixed my signature in presence of two witnesses.

SAMUEL KERSHAW.

Witnesses:

ALBERT M. MOORE,
LUDGER A. NICOL.



C. R. KING.
SOUND MODIFIER FOR TALKING MACHINES.
APPLICATION FILED MAR. 14, 1905.

Fig. 1.

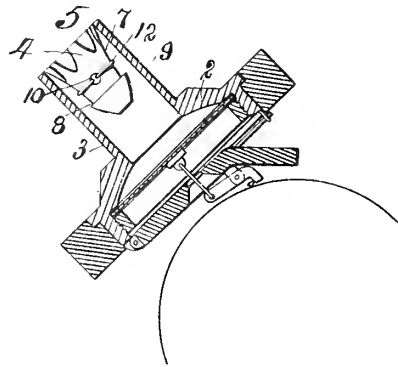


Fig. 2.

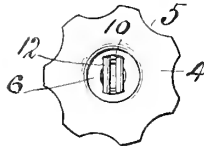


Fig. 3.

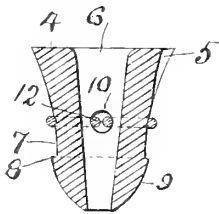
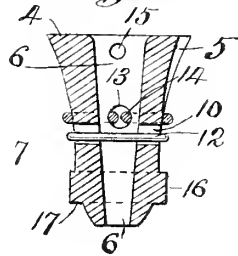


Fig. 4.



Witnesses
M. J. Mahony
H. Merrill.

Charles R. King Inventor

By his Attorney, *V. A. West*

UNITED STATES PATENT OFFICE.

CHARLES R. KING, OF NEW YORK, N. Y.

SOUND-MODIFIER FOR TALKING-MACHINES.

No. 805,077.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed March 14, 1905. Serial No. 250,038.

To all whom it may concern:

Be it known that I, CHARLES R. KING, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Modifiers for Talking-Machines, of which the following is a specification.

The object of my invention is to provide an attachment or device for reproducers of talking-machines which will modify the sound-waves produced by the diaphragm and improve the tone and render more distinct the words spoken and dampen the non-musical waves usually heard in such instruments; and to this end my invention consists in the construction, arrangement, and combination of parts, all as hereinafter described.

In the accompanying drawings, to which reference is made and which form a part of this specification, Figure 1 is a sectional elevation of a reproducer for talking-machines having my invention applied thereto. Fig. 2 is an enlarged plan view of the sound-modifier removed. Fig. 3 is a sectional elevation of the same, and Fig. 4 is a like view showing a modification.

In the drawings, 2 designates the diaphragm of a talking-machine reproducer, and 3 designates the tube thereof, to which a tube megaphone, horn, or sound-conveyer may be attached in the usual or any desired way.

4 designates the sound or wave modifier, held, preferably, about one-half inch from the diaphragm; but I do not limit myself to any specific location. As here shown, it is held in the tube 3 and is in the general form of a cone with its apex toward the diaphragm. The base is formed with marginal recesses forming outside wave or sound passages 5. Through this is formed a wave or sound passage 6, preferably diverging from the apex to the base, as shown clearly in Figs. 3 and 4. A slight convexity 7 is formed in the outer surface of the modifier which terminates at a shoulder 8; but this shoulder may be omitted, if desired, the convexity 7 then coalescing directly with the rounded end 9. In the form shown in Figs. 1, 2, and 3 a transverse passage 10 is formed through the modifier, and one or more strands 12 of wire or other suitable

material are held in said passage crossing the central sound-passage 6, the said strands acting to take up and neutralize the non-musical sound-waves projected from the diaphragm. In the form shown in Fig. 4 I have shown a second transverse passage 13 at right angles to the passage 10 and in which like strands 14 are held, which still further take up and modify the waves produced by the diaphragm. I prefer to form the modifier with a hole 15 or other suitable device by which it can be conveniently removed from the tube 3, as shown in Fig. 4, and in this form I construct the modifier with a collar 16, which forms a shoulder 17 for retarding or abruptly deflecting the sound-waves coming from the central or most active part of the diaphragm.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A sound-modifier for talking-machine reproducers the same being constructed in tapering form with a passage through it and formed with a base which fits the sound-passage leading from the reproducer, said base being formed with marginal recesses, substantially as described.

2. A sound-modifier for talking-machine reproducers, the same being constructed in tapering form with a tapering passage through it and formed with a base which fits the sound-passage leading from the reproducer, said base being formed with marginal recesses, substantially as described.

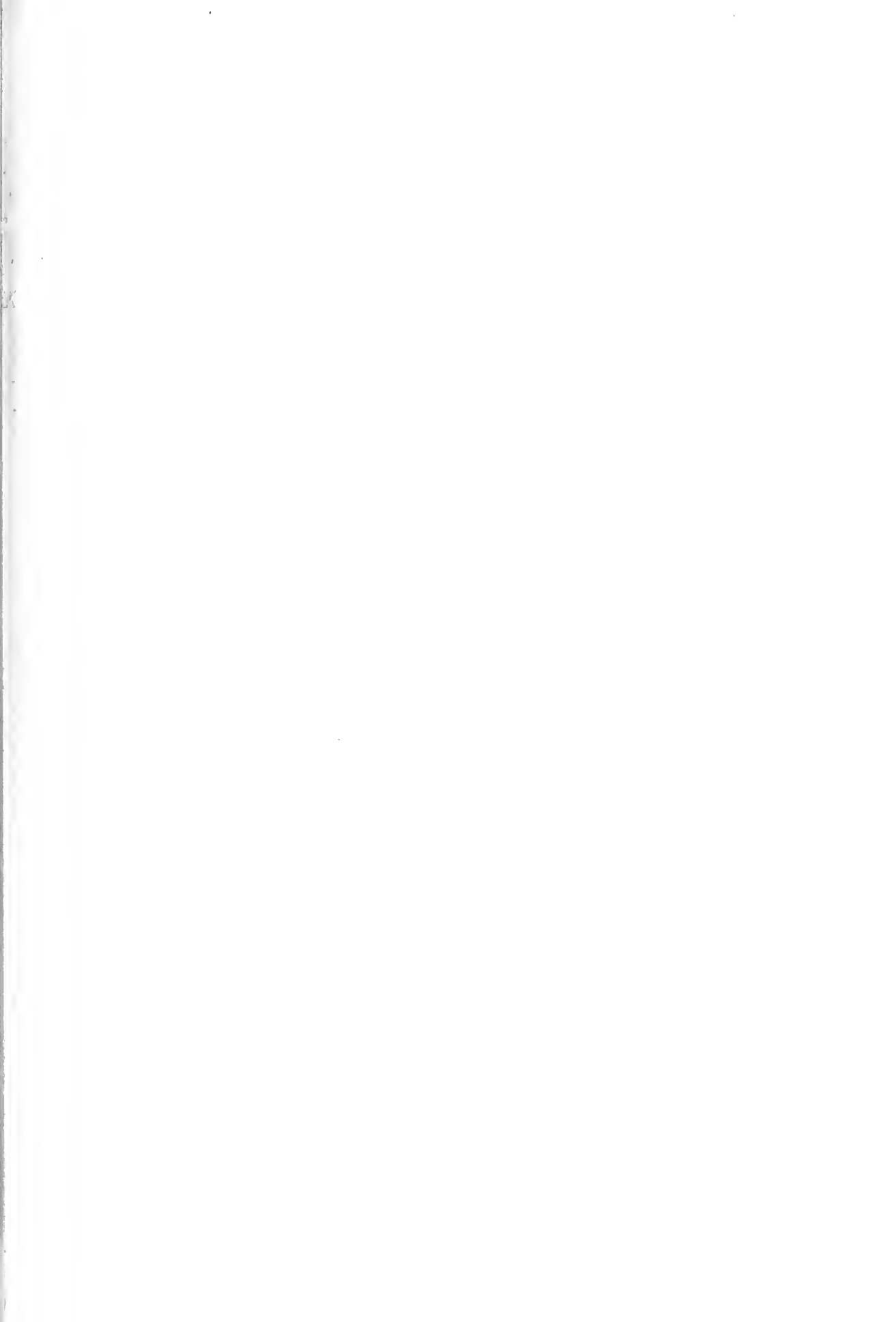
3. A sound-modifier for the reproducers of talking-machine, the same being constructed in tapering form and with a longitudinal passage through it and having one or more strands crossing said longitudinal passage, substantially as described.

4. A sound or wave modifier for talking-machines constructed in conical form and having side passages formed therein and formed with a conical longitudinal passage and provided with one or more transverse strands held in said longitudinal passage, substantially as described.

CHARLES R. KING.

Witnesses:

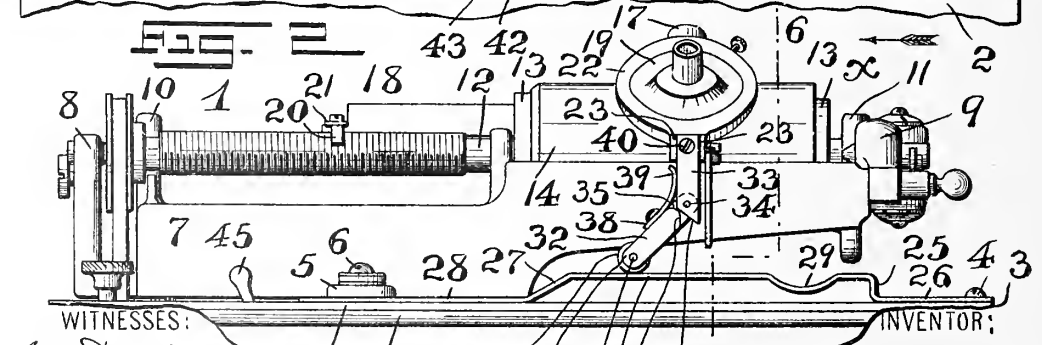
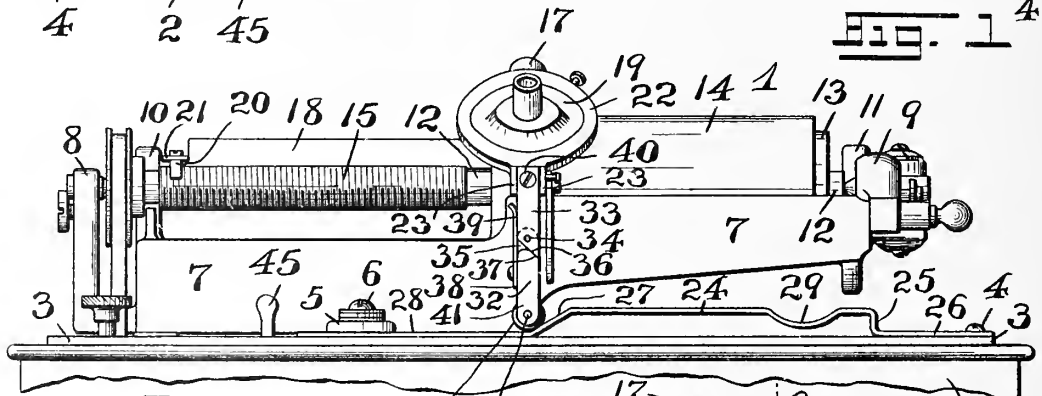
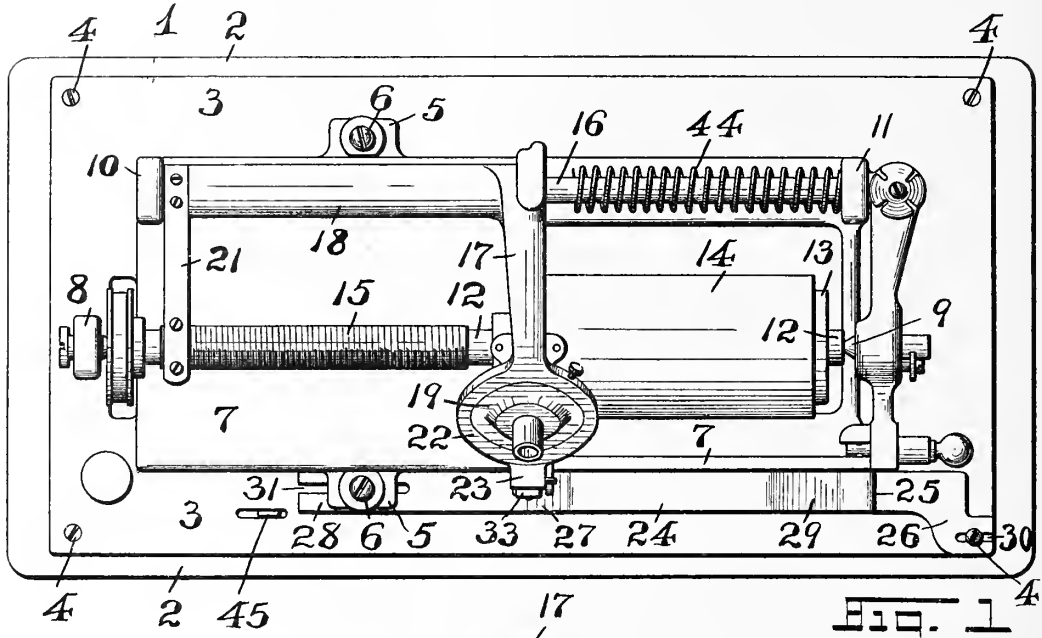
H. ALBERTUS WEST,
M. J. MAHONY.



S. FARB.
RETURNING DEVICE FOR PHONOGRAPHS.

APPLICATION FILED DEC. 31, 1904

2 SHEETS—SHEET 1.



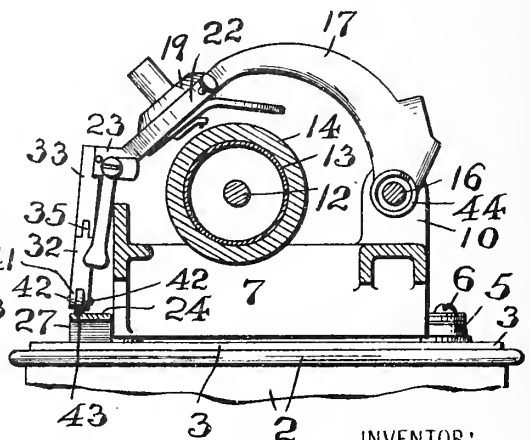
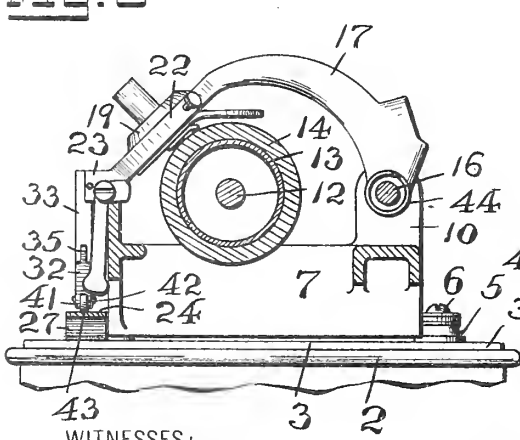
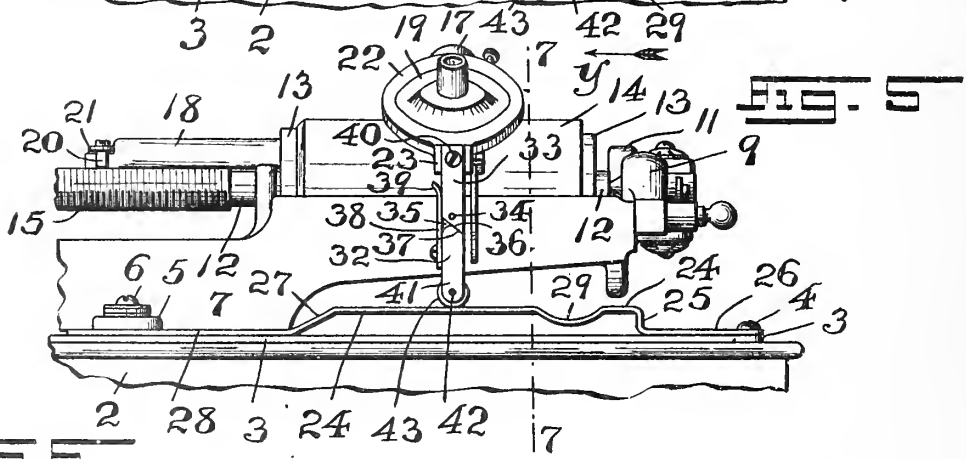
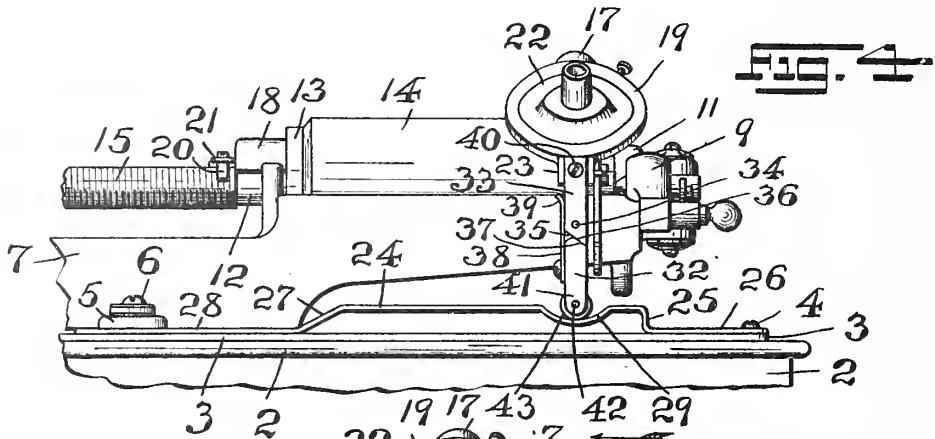
WITNESSES: *Geo. D. Richards* *F. W. Fraentzel*

INVENTOR: *Salomon Farb*

BY *Fred C. Fraentzel* ATTORNEY



S. FARB.
RETURNING DEVICE FOR PHONOGRAPHS.
APPLICATION FILED DEC. 31, 1904



WITNESSES:

Geo. J. Richards,
W. H. W. Fraentzel



INVENTOR:

Solomon Farb,
BY
Fredk. Fraentzel
ATTORNEY

UNITED STATES PATENT OFFICE.

SOLOMON FARB, OF NEWARK, NEW JERSEY, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-FOURTH TO MARCUS L. MENDELSSOHN, OF NEWARK, NEW JERSEY, AND ONE-HALF TO EDISONIA COMPANY, A CORPORATION OF NEW JERSEY.

RETURNING DEVICE FOR PHONOGRAPHS.

No. 805,417.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed December 31, 1904. Serial No. 239,184.

To all whom it may concern:

Be it known that I, SOLOMON FARB, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Returning Devices for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention has reference to improvements in phonographs and similar sound-reproducing machines; and the present invention has for its principal object to provide with machines of such character a returning device or means for automatically raising the sound-reproducer and its stylus from its operative contact with the record at the end of the record and then returning the said sound-reproducer and its stylus and the usual engaging device or nut of the machine to their normal initial or starting positions without stopping or interfering with the operating mechanism of the phonograph or similar apparatus to again cause the sound-reproducer and its stylus to be once more brought in its operative engagement with the beginning or forward end of the record.

The said invention consists, primarily, in the novel returning device or means herein-after more particularly specified; and, furthermore, this invention consists in the novel arrangements and combinations of devices and parts, as well as in the details of the construction of the same, all of which will be fully described in the following specification and then finally embodied in the clauses of the claim, which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a plan or top view of a phonograph and a top or plan view of the automatic returning device embodying the principles of my present invention, the sound-reproducer and its stylus being shown in their normal initial positions about to be moved into operative contact with the record. Fig. 2 is a front

view of the upper framework of the phonograph, the operating shaft or spindle and a record thereon, and the sound-reproducer, said view also showing in front elevation the upper portion of the usual casing upon which the said parts of the phonograph are placed, and a side view of the said automatic returning device, with a yielding post of the said returning frame of the sound-reproducer shown in its normal initial or starting position. Fig. 3 is a similar view of the said parts, showing the said sound-reproducer and the said yielding post in their forwardly-traveling relation with the record during contact or engagement of the stylus with the reproducing-surface of the record. Fig. 4 is a front view of portions of some of the parts represented in said Figs. 1, 2, and 3 and a front view of the said sound-reproducer and automatic returning device, showing the relative positions of the sound-reproducer and the said yielding post of the returning device at the end of the record; and Fig. 5 is a similar view of the same parts, showing the sound-reproducer in its raised position from the surface of the record and the relative arrangement of the parts of the yielding post of the returning device while returning to their normal initial or starting positions at the beginning or forward end of the record. Fig. 6 is a transverse vertical section taken on line 6 6 in said Fig. 3 looking in the direction of the arrow *x*, and Fig. 7 is a similar section taken on line 7 7 in said Fig. 5 looking in the direction of the arrow *y*.

Similar characters of reference are employed in all of the said above-described views to indicate corresponding parts.

Referring now to the said several figures, the reference character 1 indicates any usual form and construction of phonograph or similar apparatus, comprising the usual box or casing 2, in which the motor or driving mechanism is arranged and upon which is supported and secured, by means of the usual screws 4, the phonograph-base 3. Suitably secured upon the said base or plate 3, by means of the usual lugs 5 and screws 6, is the framework 7 of the phonograph, provided with the suitably-disposed bearings 8 and 9 and 10 and 11. Between the said bearings 8 and 9 is rotatively arranged the main shaft or spindle

12, which is provided upon a portion thereof with an enlarged cylindrical member 13, upon which the usual record 14 is arranged and held in the well-known manner. The remain-

5 ing portion of the said main shaft or spindle is provided with a screw-thread 15, as shown.

Suitably secured between the bearings 10 and 11 is a back rod or guide 16, upon which is pivotally and slidably arranged in the usual
10 manner the part 18 of the oscillating frame 17, to which is affixed the usual sound-reproducer 19. The longitudinal sliding movement of the said oscillating frame 17 and its parts
15 18 in the forward direction, which causes the operative engagement of the stylus of the sound-reproducer with the surface of the record 14, is caused by the engagement of the usual screw-threaded contacting device or
20 nut 20 with the screw-thread 15 of the main shaft or spindle 12, said device or nut 20 being connected with the part 18 of the oscillating frame 17 by means of the usual arm or bar 21, all of which is clearly illustrated in
25 Fig. 1 of the drawings. The said sound-reproducer 19 is secured in the usual ring-shaped holding part or member 22 of the oscillating frame 17, and the said part or member 22 is provided with the usual forwardly-projecting lug or extension 23.

30 The above-described features and parts are all old and well known and form part of the usual phonograph construction.

Coming now to the automatic returning device or means embodying the principles of
35 my present invention, the same comprises in general two main parts—namely, a track-plate and a yielding post—all constructed and arranged substantially in the manner to be presently described. The said track-plate consists, essentially, of a raised portion 24 of
40 approximately the same or somewhat greater length than that of the cylindrical member 13, the said portion 24 being connected at its one end by means of an offset 25 with an end member or portion 26 and at its other end by means of an inclined part 27 with another
45 end member or portion 28, substantially as illustrated in the several figures of the drawings. The said raised portion 24 of the track-plate is provided at a suitable point near the
50 offset 25 with a suitably-shaped depression 29, preferably of the configuration shown in Figs. 2 to 5, inclusive. The said track-plate, as will be clearly evident, may be struck up from
55 sheet metal, or it may be cast, or the several parts thereof may be made in separate pieces and then suitably secured together. That the track-plate may be suitably secured in its fixed position upon the said base or plate 3
60 the end portion or member 26 is provided with a suitable slot 30, and the other end portion or member 28 is provided with a suitable slot 31, which slots 30 and 31 are arranged, respectively, about the shanks of one of the
65 screws 4 and a screw 6, in the manner shown

more particularly in Fig. 1 of the drawings, when said screws have been slightly loosened and then tightened up again to secure said track-plate in its fixed position upon the said base or plate 3. Thus it will be clearly seen
70 that the track-plate can be securely affixed in its operative position upon the said base or plate 3 without the employment of additional fastening devices or without the necessity of
75 drilling additional screw-holes in the said base or plate 3. It will be understood, however, that the said track-plate may be otherwise constructed and may be secured in place by fastening means other than those herein shown.

The yielding post of the returning device
80 comprises two arms or members 32 and 33, which are suitably connected in the manner of a hinge by means of a pin 34. The lower arm 32 is formed with a tongue 35, which extends into the lower and slotted end portion
85 of the upper arm 33, substantially as illustrated, the said upper arm 33 having a sharp and downwardly-extending inclined edge 36, against which are forced correspondingly-formed edges 37 upon the lower arm 32 under
90 certain conditions, as will hereinafter appear, by the action of a spring 38. The said spring 38 is suitably secured at its lower end upon the side of the lower arm 32 and has its upper
95 end portion 39 in bearing contact with the side of the upper arm 33. In this manner the two arms 32 and 33 are suitably connected so that they will yield in one direction at their
100 hinged connection, in the manner of an elbow, when pressure is applied to the one side, in the present case the left side, of the connected arms, but will form practically a rigid post when the pressure is exerted upon the opposite side of the said connected arms. The
105 upper end portion of the said upper arm 33 is suitably secured, by means of a screw 40 or other fastening means, to the previously-mentioned projection 23 of the oscillating frame 17, and the lower and preferably bifurcated
110 end portion 41 of the said lower arm 32 has a pin 42, upon which is arranged a suitable roller or wheel 43, adapted to be brought in rolling contact with the upper surfaces of the various parts of the track-plate hereinabove
115 described. Encircling the said back rod, bar, or guide 16, upon that portion thereof between the bearing 11 and the oscillating frame 17, is a coiled spring 44, as clearly illustrated in
120 Fig. 1 of the drawings and for the purpose to be presently described.

Having in the above set forth the general arrangements and combinations of the various devices and parts, I will now briefly describe the operations of the same.

In their normal initial positions all the de-
125 vices and parts are in their relatively inactive positions. (Indicated in Figs. 1 and 2 of the drawings.) Now suppose the driving mechanism of the phonograph to have been wound up in the usual manner and a record 14 to
130

have been slipped upon the cylindrical receiving portion or member 13 of the main shaft or spindle 12. By throwing over the starting-lever 45 from right to left the spindle or shaft 12 begins to revolve, and the sound-reproducer 19 and its stylus are moved from left to right in operative contact with the reproducing-surface of the record 14. The tension of the spring 38 is such that during this forward movement of the oscillating frame 17 in the usual manner and the parts connected with said frame the said spring 38 will yield against the exerted pressure, thereby causing the lever-arm 32 of the yielding post to assume an angular or tilted position, (indicated in Figs. 3 and 6 of the drawings,) the roller or wheel 43 first riding up the incline 27 and then rolling along the raised portion 24 of the track-plate until the sound-reproducer 19 has reached the end of the record, when the said wheel or roller 43 will have suddenly passed into the depression 29 of the track-plate, thereby permitting the spring 38 to act and bringing the said lower arm 32 once more in straight vertical alignment with the upper arm 33, as clearly represented in Fig. 4 of the drawings. Immediately the stylus of the sound-reproducer 19 and the feeding or actuating device 20, respectively, are raised by the straightened-out members or arms 32 and 33 of the yielding post from their operative engagement with the record 14 and the said screw-thread 15 of the main shaft or spindle 12, as illustrated in Fig. 7 of the drawings, and the previously-compressed spring 44, which is now free to act, and its coils in assuming their normally distended relation to each other automatically force all the movable parts in the direction of the arrow *y* in Fig. 5 to their normal initial or starting positions (shown in Figs. 1 and 2 of the drawings) without having stopped or interfered with the rotary motion of the spindle or shaft 12. As soon as the parts have thus been forced back to their normal initial positions the device 20 is again actively brought into its engagement with the screw 15 of the shaft or spindle 12, because of the yielding post being once more located in front of the incline 27, and the forward movement of the sound-reproducer and contact of its stylus with the record again take place in the manner previously described. In this manner a reciprocatory movement of the parts back and forth can be produced automatically as long as desired and until the power is shut off by throwing the lever 45 back into its former position. (Indicated in Fig. 2 of the drawings.)

The tensions of the various springs 38 and 44 are made to suit the existing conditions, as will be clearly evident, and the tension of the spring 38 is such that it will not interfere with the forward movement of the sound-reproducer 19, the arm 32 yielding to the pressure exerted, but said spring 38 acting to produce

a practically rigid connection of the arm 32 with the arm 33 by engagement of the edge 37 of the one arm with the corresponding edges of the other arm during the return movement of the parts, and thus sufficiently raising the sound-reproducer 19 and its stylus above the surface of the record that the latter will not become damaged by improper contact of the parts.

The simplicity of the construction of the parts of the returning device and the ease and readiness with which said device can be attached in its operative position to existing phonographs and similar apparatus are evidenced from the foregoing description of my invention and will not be further dwelt upon at this time.

I am fully aware that many changes may be made in the arrangements and combinations of the devices and parts, as well as in the details of the construction of the same, without departing from the scope of my present invention. Hence I do not limit my invention to the exact arrangements and combinations of the devices and parts as described in the foregoing specification and as illustrated in the accompanying drawings, nor do I confine myself to the exact details of the construction of any of the said parts.

Having thus described my invention, what I claim is—

1. In a phonograph, or other similar apparatus, the combination, with the shaft or spindle provided with a record-receiving means, and a forwardly-moving oscillating frame and sound-reproducer, of a returning device arranged and constructed to permit the forward operative engagement of the stylus of the sound-reproducer with a record, but at the end of the record raising said sound-reproducer and its stylus from engagement with the record and automatically returning the movable parts to their normal initial or starting positions, said returning device comprising a pair of connected arms adapted to assume a yielding relation during the forward movement of the sound-reproducer, and a rigid relation during the return movement of said sound-reproducer, substantially as and for the purposes set forth.

2. In a phonograph, or other similar apparatus, the combination, with the shaft or spindle provided with a record-receiving means, and a forwardly-moving oscillating frame and sound-reproducer, of a returning device arranged and constructed to permit the forward operative engagement of the stylus of the sound-reproducer with a record, but at the end of the record raising said sound-reproducer and its stylus from engagement with the record, and a compression-spring for returning the movable parts to their normal initial or starting positions, said returning device comprising a pair of connected arms adapted to assume a yielding relation during

the forward movement of the sound-reproducer, and a rigid relation during the return movement of said sound-reproducer, substantially as and for the purposes set forth.

5 3. In a phonograph, or other similar apparatus, the combination, with the shaft or spindle provided with a record-receiving means, and a forwardly-moving oscillating frame and sound-reproducer, of a returning device arranged and constructed to permit the forward
10 operative engagement of the stylus of the sound-reproducer with a record, but at the end of the record raising said sound-reproducer and its stylus from engagement with
15 the record and automatically returning the movable parts to their normal initial or starting positions, said returning device comprising a pair of pivotally-connected arms, a spring on one of said arms having another
20 portion in yielding contact with the other arm, said arms being adapted to assume a yielding relation during the forward movement of the sound-reproducer, and a rigid relation during the return movement of said
25 sound-reproducer, substantially as and for the purposes set forth.

4. In a phonograph, or other similar apparatus, the combination, with a shaft or spindle provided with a record-receiving means, and
30 a forwardly-moving oscillating frame and sound-reproducer, of a returning device arranged and constructed to permit the forward operative engagement of the stylus of the sound-reproducer with a record, but at the
35 end of the record raising said sound-reproducer and its stylus from engagement with the record, and a compression-spring for returning the movable parts to their normal initial or starting positions, said returning
40 device comprising a pair of pivotally-connected arms, a spring on one of said arms having another portion in yielding contact with the other arm, said arms being adapted to assume a yielding relation during the forward
45 movement of the sound-reproducer, and a rigid relation during the return movement of said sound-reproducer, substantially as and for the purposes set forth.

5. A returning device for phonographs and
50 other similar apparatus, comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a sound-reproducer and its stylus, a track-plate provided with a raised portion, and a yielding
55 post comprising a pair of hinged arms, one of said arms being secured to said oscillating frame, a roller attached to the lower end of said other arm, said roller being arranged in rolling engagement with said track-
60 plate, said arms being arranged that during the forward movement of the parts the said sound-reproducer and its stylus will be in operative contact with a record, but at the end of the record said arms raising the said sound-
65 reproducer and its stylus from the surface of

the record, substantially as and for the purposes set forth.

6. A returning device for phonographs and other similar apparatus comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a
70 sound-reproducer and its stylus, a track-plate provided with a raised portion, and a yielding post comprising a pair of hinged arms, one of said arms being secured to said oscillating frame, a roller attached to the lower
75 end of said other arm, said roller being arranged in rolling engagement with said track-plate, said arms being arranged that during the forward movement of the parts the said sound-reproducer and its stylus will be in operative
80 contact with a record, but at the end of the record said arms raising the said sound-reproducer and its stylus from the surface of the record, and means for returning the said sound-reproducer and its stylus and said yielding
85 post to their normal initial positions, substantially as and for the purposes set forth.

7. A returning device for phonographs and other similar apparatus comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a
90 sound-reproducer and its stylus, a track-plate provided with a raised portion, and a yielding post comprising a pair of hinged arms, one of said arms being secured to said oscillating frame, a roller attached to the lower
95 end of said other arm, said roller being arranged in rolling engagement with said track-plate, a leaf-spring secured at one end to the lower one of said arms, said spring having its opposite end in engagement with the upper
100 one of said arms, said arms being arranged that during the forward movement of the parts the said sound-reproducer and its stylus will be in operative contact with a record, but at the end of the record said arms raising the
105 said sound-reproducer and its stylus from the surface of the record, substantially as and for the purposes set forth.

8. A returning device for phonographs and other similar apparatus, comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a
110 sound-reproducer and its stylus, a track-plate provided with a raised portion, and a yielding post comprising a pair of hinged arms, one of said arms being secured to said oscillating frame, a roller attached to the
115 lower end of said other arm, said roller being arranged in rolling engagement with said track-plate, a leaf-spring secured at one end to the lower one of said arms, said spring having its opposite end in engagement with the
120 upper one of said arms, said arms being arranged that during the forward movement of the parts the said sound-reproducer and its stylus will be in operative contact with a record, but at the end of the record said arms
125 raising the said sound-reproducer and its stylus from the surface of the record, substantially as and for the purposes set forth.

stylus from the surface of the record, and means for returning the said sound-reproducer and its stylus and said yielding post to their normal initial positions, substantially as and for the purposes set forth.

9. A returning device for phonographs, and other similar apparatus comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a sound-reproducer and its stylus, a track-plate consisting, essentially, of a raised portion 24 provided with a depression 29, an offset at one end of said portion 24 and an incline 27 at the other end thereof, end portions connected respectively with said offset and said incline, means in engagement with said end portions for securing said track-plate in position, and a yielding post connected with said oscillating frame, said post having its lower end in movable engagement with the incline and the raised portion of the track-plate, said post being arranged that during the forward movement along the said raised portion 24 the sound-reproducer and its stylus will be in operative contact with a record, but when the said post enters said depression 29 said post raising the said sound-reproducer and its stylus from the surface of the record, substantially as and for the purposes set forth.

10. A returning device for phonographs, and other similar apparatus, comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a sound-reproducer and its stylus, a track-plate consisting, essentially, of a raised portion 24 provided with a depression 29, an offset at one end of said portion 24 and an incline 27 at the other end thereof, end portions connected respectively with said offset and said incline, means in engagement with said end portions for securing said track-plate in position, and a yielding post connected with said oscillating frame, said post having its lower end in movable engagement with the incline and the raised portion of the track-plate, said post being arranged that during the forward movement along the said raised portion 24 the sound-reproducer and its stylus will be in operative contact with a record, but when the said post enters said depression 29 said post raising the said sound-reproducer and its stylus from the surface of the record, and means for returning the said sound-reproducer and its stylus and said yielding post to their normal initial positions, substantially as and for the purposes set forth.

11. A returning device for phonographs and other similar apparatus comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a sound-reproducer and its stylus, a track-plate consisting, essentially, of a raised portion 24 provided with a depression 29, an offset at one

end of said portion 24 and an incline 27 at the other end thereof, end portions connected respectively with said offset and said incline, means in engagement with said end portions for securing said track-plate in position, and a yielding post comprising a pair of hinged arms, one of said arms being secured to said oscillating frame, a roller attached to the lower end of said other arm, said roller being arranged in rolling engagement with the incline and the raised portion of the track-plate, said arms being arranged that during the forward movement of the parts the sound-reproducer and its stylus will be in operative contact with a record, but when said roller enters said depression 29 said arms raising the said sound-reproducer and its stylus from the surface of the record, substantially as and for the purposes set forth.

12. A returning device for phonographs and other similar apparatus comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a sound-reproducer and its stylus, a track-plate consisting, essentially, of a raised portion 24 provided with a depression 29, an offset at one end thereof, end portions connected respectively with said offset and said incline, means in engagement with said end portions for securing said track-plate in position, and a yielding post comprising a pair of hinged arms, one of said arms being secured to said oscillating frame, a roller attached to the lower end of said other arm, said roller being arranged in rolling engagement with the incline and the raised portion of the track-plate, said arms being arranged that during the forward movement of the parts the sound-reproducer and its stylus will be in operative contact with a record, but when said roller enters said depression 29 said arms raising the said sound-reproducer and its stylus from the surface of the record, substantially as and for the purposes set forth.

13. A returning device for phonographs and other similar apparatus comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a sound-reproducer and its stylus, a track-plate consisting, essentially, of a raised portion 24 provided with a depression 29, an offset at one end of said portion 24 and an incline 27 at the other end thereof, end portions connected respectively with said offset and said incline, means in engagement with said end portions for securing said track-plate in position, and a yielding post comprising a pair of hinged arms, one of said arms being secured to said oscillating frame, a roller attached to the lower end of said other arm, said roller being arranged in rolling engagement with the incline and the raised portion of the track-plate, a leaf-spring secured at one end to the lower one of said arms, said spring having its opposite end in engagement with the up-

per one of said arms, said arms being arranged that during the forward movement of the parts the sound-reproducer and its stylus will be in operative contact with a record, but when said roller enters said depression 29 said arms raising the said sound-reproducer and its stylus from the surface of the record, substantially as for the purposes set forth.

14. A returning device for phonographs and other similar apparatus comprising, in combination, with the main framework and a forwardly-moving oscillating frame carrying a sound-reproducer and its stylus, a track-plate consisting, essentially, of a raised portion 24 provided with a depression 29, an offset at one end of said portion 24 and an incline 27 at the other end thereof, end portions connected respectively with said offset and said incline, means in engagement with said end portions for securing said track-plate in position, and a yielding post comprising a pair of hinged arms, one of said arms being secured to said oscillating frame, a roller attached to the lower end of said other arm, said roller being arranged in rolling engagement with the incline and the raised portion of the track-plate, a leaf-spring secured at one end to the lower one of said arms, said spring having its opposite end in engagement with the upper one of said arms, said arms being arranged that during the forward movement of the parts the sound-reproducer and its stylus will be in operative contact with a record, but when said roller enters said depression 29 said arms raising the said sound-reproducer and its stylus from the surface of the record, and means for returning the said sound-reproducer and its stylus and said yielding post to their normal initial positions, substantially as and for the purposes set forth.

15. In a phonograph or similar apparatus, the combination, with a revolving shaft provided with a record-receiving means, of a back rod or guide 16, an oscillating frame slidably arranged on said rod, a sound-reproducer and stylus on said oscillating frame, means for raising said frame and said sound-

reproducer and stylus above the surface of the record, and a spring encircling said rod or guide for returning said frame and its parts to their normal initial positions, substantially as and for the purposes set forth.

16. In a phonograph or similar apparatus, the combination, with a revolving shaft provided with a record-receiving means, of a back rod or guide 16, an oscillating frame slidably arranged on said rod, a sound-reproducer and stylus on said oscillating frame, means for raising said frame and said sound-reproducer and stylus above the surface of the record, consisting of a pair of hinged and spring-controlled arms, one of which is attached to said oscillating frame, and a spring encircling said rod or guide for returning said frame and its parts to their normal initial positions, substantially as and for the purposes set forth.

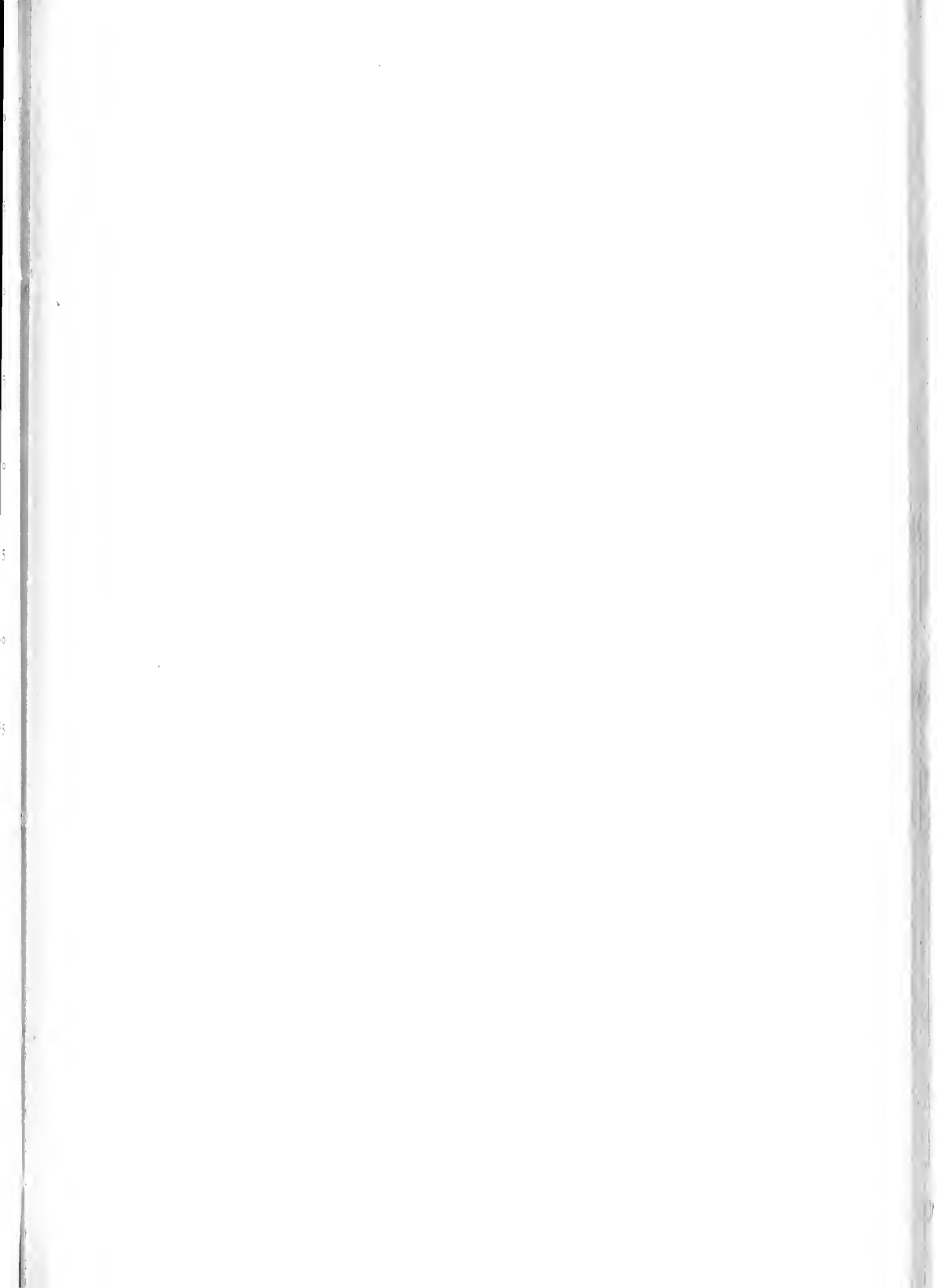
17. In a phonograph or similar apparatus, the combination, with a revolving shaft provided with a record-receiving means, of a back rod or guide 16, an oscillating frame slidably arranged on said rod, a sound-reproducer and stylus on said oscillating frame, means for raising said frame and said sound-reproducer and stylus above the surface of the record, consisting of a pair of hinged and spring-controlled arms, one of said arms being attached to said oscillating frame, and a roller connected with the other of said arms, a track-plate upon the framework of the phonograph, said track-plate being provided with a raised portion upon which said roller rides, and a spring encircling said rod or guide for returning said oscillating frame and its parts to their normal initial positions, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 29th day of December, 1904.

SOLOMON FARB.

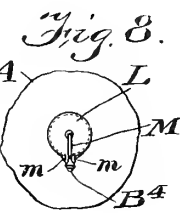
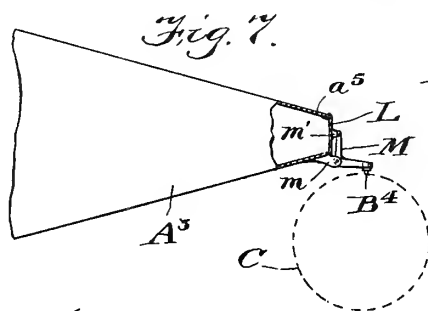
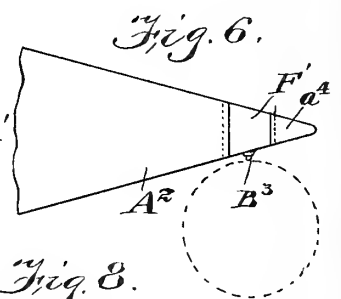
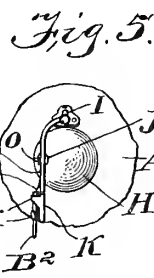
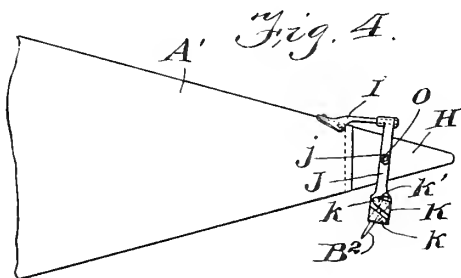
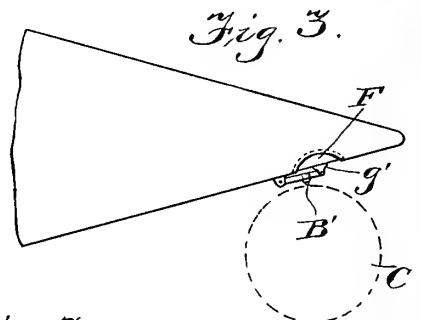
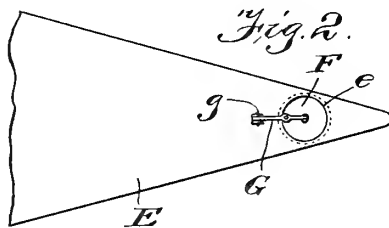
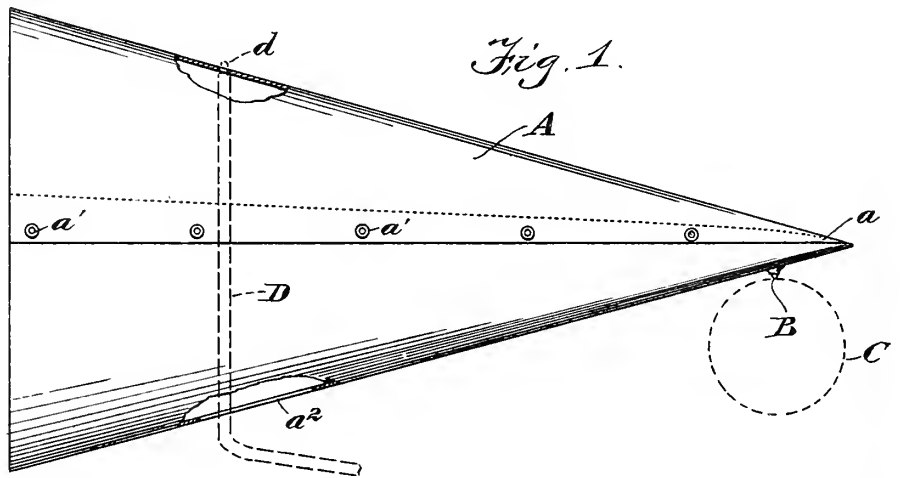
Witnesses:

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R. HEAD.
PHONOGRAPH REPRODUCING SOUND BOX OR HORN.

APPLICATION FILED MAY 18, 1904.



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UNITED STATES PATENT OFFICE.

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PHONOGRAPH REPRODUCING SOUND BOX OR HORN.

No. 805,544.

Specification of Letters Patent.

Patented Nov. 28, 1905.

Application filed May 18, 1904. Serial No. 208,539.

To all whom it may concern:

Be it known that I, ROBERT HEAD, a citizen of the United States, residing at the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Phonograph Reproducing Sound Boxes or Horns; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in phonographs, wherein I seek to provide novel means for reproducing sounds which are free from objectionable harsh metallic notes and tones, such as are commonly secured by ordinary machines of this class. I also aim to dispense with that part of the ordinary machine commonly known as the "reproducer," which usually consists of a metallic body or sound-box and a pliable diaphragm confined or held therein, whereby I am able to materially cheapen the cost of manufacture.

The invention is susceptible of embodiment in one form of construction in such manner as to produce a machine at much less cost than those heretofore made and that is well adapted for use as an advertising novelty; but of course my invention may also be manufactured to meet the demands for a better or higher grade of machine.

Broadly speaking, my invention consists of a phonograph member which combines in one and the same structure a sound box or horn and a reproducer, so that this member may be aptly termed a "reproducing sound box or horn."

I have found that a sound box or horn made of a non-metallic substance, such as stiff paper or other material, with a stylus attached or connected to a section thereof at such a point as will afford the necessary tension or pliability, is well adapted to reproduce sounds from a record of any suitable nature, either a cylindrical record or a disk record, the tapering form of the horn materially amplifying the sound-waves produced by the vibration of said section of the horn or trumpet. According to this form of the invention the stylus, preferably of a non-metallic nature, is united directly to a portion of the conical sound box or horn near the closed apex thereof and to a part of said box or horn which is under the required tension or which has the necessary pliability to enable it to return with the stylus quickly to the original condition

subsequent to deflection by the undulations in the record, whereby the vibrating section or member and the stylus are actuated by the high points or hills of the record and are returned to normal positions by the pliability of said section or member when the stylus travels in the depressions or valleys of the record.

The invention is also susceptible of embodiment in various other forms of construction; but in all forms of my reproducing sound box or horn the stylus and the vibratory member or diaphragm are preferably made of non-metallic materials in order to avoid the harsh metallic tones and the objectionable grating sounds. A paper sound box or horn with a glass stylus has been found to give exceedingly good results; but of course I do not desire to limit myself to these particular materials.

In another form of construction I employ a conical sound box or horn with a pliable section or diaphragm forming an integral part of the structure located at or close to the closed end thereof, said pliable section or diaphragm being vibrated by a stylus in contact with a record, and said stylus being connected either directly to the vibratory diaphragm or through the instrumentality of intermediate devices. These devices may be employed for several purposes, such as for amplifying the vibrations of the diaphragm or to enable the reproducing sound box or horn to be used in connection with a disk record or a cylindrical record or to provide for the expeditious interchange of one stylus-pin for another.

Although I have stated that the reproducing sound box or horn may be made of paper or other non-metallic materials, it is to be understood that by using a vibrating diaphragm or section of mica or other pliable material I may employ a metallic horn the active sound-producing part of which is made of said pliable diaphragm or section. In some cases a metallic horn with a thin-metal vibratory diaphragm or section may be used, the broad feature of the invention consisting of a reproducing sound box or horn having a vibratory portion, section, or diaphragm with which is associated a stylus that is effective in giving pulsations thereto without the employment of an ordinary reproducer.

Further objects and advantages of the invention will appear in the course of the sub-

joined description, and the actual scope of the invention will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which like characters of reference are used to indicate corresponding parts in all the figures.

Figure 1 is a side elevation of my improved sound box or horn for phonographs, the same being shown in coöperative relation to a phonograph-cylinder and a suitable supporting-stem. Figs. 2 and 3 are views in bottom plan and side elevation, illustrating another embodiment of the invention. Figs. 4 and 5 are views in side elevation and in end elevation, respectively, of a further embodiment of the invention. Fig. 6 is a side elevation of another form of construction. Figs. 7 and 8 are views in side and end elevation, respectively, of a still further modified construction.

In the form of construction shown by Fig. 1 the sound box or horn is represented in the form of a cone which is closed at the apex, as at a , and open at the mouth. The sound-box may be of any desired size and capacity, the same consisting of a cone closed at one end; but, as shown by the several figures of the drawings, this conical sound-box is extended into a horn of any desired size and capacity. I prefer to make the sound-box of non-metallic material, the same being made, preferably although not essentially, of stiff paper or cardboard bent into a conical form and having overlapping edges, the latter being united or fastened by any suitable devices, such as the ball-and-socket fasteners indicated at a' . These fastenings detachably unite the edges of the horn or sound-box and enable the material to be shipped either in a rolled or in a flat condition.

In connection with the conical sound box or horn A, I employ a stylus, (indicated at B,) the same being connected with a part of the sound-box that is under the required tension or which has the necessary pliability to enable vibrations to be given thereto by the movement of the stylus as it follows the undulations in the record. In the form of construction shown by Fig. 1 this stylus is united in a suitable way directly to one side of the sound box or horn near the closed end or apex thereof, whereby that part of the horn or sound-box to which the stylus is attached is adapted to have vibrations imparted thereto in a way to serve as a diaphragm, thus enabling the sound box or horn to reproduce of itself the sound-waves, the latter being increased in volume as they flow through the sound box or horn. I have found that the good results are obtained by fastening or attaching the stylus to the conical sound-box at a short distance from the closed apex thereof; but this stylus must not be located too close to the apex a of the sound-box, nor must it

be located too far toward the open end or mouth of the sound-box. I prefer to employ a non-metallic stylus, and it has been found that a stylus made of glass or other similar material gives excellent results. Said stylus may be united directly to a vibratory section or part of the sound-box by a sealing material; but it is evident that the particular fastening adopted may be modified within certain limits.

The reproducing sound-box shown by Fig. 1 is especially designed for use in connection with cylindrical records, the position of which is indicated at C. Of course the horn is mounted to project over the cylindrical record in order that the weight of the horn may be imposed on the record, and thus keep the stylus B in engagement with the grooved or channeled working surface of said record. It is to be understood that the record has rotary movement given thereto by any suitable type of mechanical device; but as the means for supporting and rotating the record do not form a part of my invention I have not considered it necessary to illustrate and describe the same in detail herein.

As before indicated, the sound box or horn A is adapted to be mounted by suitable devices which permit the sound-box to turn on a vertical axis as the stylus follows the groove or channel in the record, and in Fig. 1 I have indicated a simple device adapted to support said sound-box. A vertical stem or spindle D passes through a slot a'' in the lower side of the sound-box, and the upper end of this spindle has a shoulder and tenon, the latter being indicated at d and shown as fitting in an opening in the upper side of the sound-box. The weight of the sound-box at its open mouth rests on the shoulder of the spindle, and the slot a'' in the lower side of the sound-box permits the latter to turn on the tenon d as the stylus B travels along the record.

In the forms of construction shown by Figs. 2 to 8, inclusive, I have shown a sound-box having vibratory diaphragms, preferably of non-metallic nature, and forming parts of metallic horns, and with these diaphragms are associated different forms of stylus which are combined with devices that enable the sound-box to be used in connection either with cylindrical records or disk records.

In Figs. 2 and 3 a sound-box E is provided near its closed apex with an opening e , which is covered by a diaphragm F, the latter being of curvilinear form and united to the sound-box in a way to place it under tension. I prefer to make this diaphragm F of mica or other non-metallic material, said diaphragm being located in one side of the horn. The stylus B' is attached to an arm G, the latter being located on the under side of the sound-box and having one end pivoted, as at g , to the said sound-box E, while its other end is united in a suitable way, as at g' , to the diaphragm

F. In this form of construction I prefer to employ a non-metallic stylus and a non-metallic diaphragm, although these parts may be made of metal, if desired.

5 In Figs. 4 and 5 there is shown a form of sound box or horn that is adapted for use in connection with a disk record, the latter being adapted for rotation on a vertical axis, while the cylindrical record C rotates on a horizontal axis. In the construction shown by said figures the sound-box H is preferably of conical form, closed at its apex, and made, preferably, of non-metallic material, such as mica, although other materials may be used. This conical sound-box is extended into or united with a horn A', which may be of metal or other material. An arm I is attached to the horn, and on this arm is hung or pivoted a vibratory arm J, the latter being united to the conical sound-box H at the point indicated at j. This vibratory arm depends below the sound-box H, to which it is united, and at its lower part said arm is provided with means which enables a stylus B² to be removed and replaced by a fresh stylus easily and quickly. This supporting and holding means is in the form of a clamp K, having spring-fingers k, the latter extending in opposite directions. These fingers are spaced or separated a short distance on a diagonal line, and on one side of the uppermost finger is a curved ledge k'. In fitting a stylus-pin B² in a clamp or holder it is placed in the diagonal space between the fingers for the blunt end or heel of said pin to engage with the curved shoulder k', and this pin is then turned to press it into engagement with the fingers k, the latter yielding to the passage of the pin and the heel of said pin riding against the curved shoulder k', which shoulder limits the endwise movement of the pin in the holder and determines its position therein. The fingers of the holder confine the pin firmly in place; but when it is desired to remove the pin it is only necessary to press it in the reverse direction, thereby disengaging it from the fingers k and enabling the operator to lift the pin out of the holder with ease.

A simple form of sound-box is shown in Fig. 6 of the drawings, wherein a vibratory section or part F' of non-metallic material forms a vibratory diaphragm and an integral part of a conical sound-box, such as A². This vibratory section F' is circular in cross-section and tapered lengthwise, the same being united to the parts A² a' of the conical sound box or horn, the part a' forming the closed apex of said sound-box. This vibratory section F' is of mica or similar material, and it is united in any appropriate way to the other parts of the sound-box. The stylus B³ is of glass or other non-metallic material, and it is shown as being united directly to the vibratory diaphragm F', although said stylus may be connected with said diaphragm by either of the

devices disclosed in this application or by any suitable means.

A sound-box A³ of another form of construction is represented by Figs. 7 and 8, wherein a small end a³ is cut off and left open, as shown. This open end of the sound-box is closed by a flexible diaphragm L, the same being of non-metallic material, such as mica, and attached in a suitable way to the body of the sound-box. A lug m extends rearwardly from the sound-box, and to it is pivoted an angle-lever M, one end of which is attached, as at m', to the diaphragm L, while the other arm is equipped with a stylus B⁴, the latter being attached to ride on a cylindrical record C.

In each form of construction heretofore shown and described the stylus follows the undulations in the record when the latter is rotated, and vibratory movement is imparted by the stylus to the diaphragm or vibratory section of the sound-box. The vibration of the diaphragm or other part or section of the sound-box reproduces the sound-waves, which are amplified in volume as they flow through the horn.

I prefer to make the sound-box and the stylus of non-metallic materials for the purpose of overcoming the harsh metallic tones which are commonly produced by ordinary instruments or machines having metallic diaphragms and a metallic stylus.

The several devices heretofore described contemplate the use of various forms of sound-boxes, either of which may be equipped with means to adapt it for use on a disk record or on a cylindrical record. I also contemplate the provision of a sound box or horn with two styli, one of which is adapted for use on a disk and the other on a cylinder, thereby enabling a single horn to be used at will and without change or modification in its structure on either kind of record. One such embodiment of the invention is shown by Figs. 4 and 5, wherein a stylus for a disk is indicated at B², while the other stylus is designated at O. It is to be understood that a sound-box equipped as described may be used by simply changing its position to bring one or the other stylus into service with the proper kind of record.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a phonograph, or similar machine, a reproducing-horn having a stylus attached directly thereto.

2. In a phonograph, or similar machine, a reproducing-horn closed at one end, and a stylus connected directly to a vibratory part of said horn.

3. In a phonograph, or similar machine, a reproducing-horn having a vibratory part and a stylus connected directly to said vibratory part.

4. A phonograph reproducing device, having a curvilinear vibratory member, a part of

said member being composed of a different material from the main body thereof, and a stylus connected with said vibratory part.

5 5. A phonograph reproducing device, having a vibratory member, a part of said member being composed of a different material from the main body thereof, and a stylus attached directly to said vibratory part.

10 6. A phonograph sound-reproducer, a part of which is a curvilinear surface forming a vibratory diaphragm, and a stylus attached rigidly and directly to said diaphragm.

15 7. A phonograph-horn having a curvilinear surface which forms a vibratory member, and a stylus projecting directly from the member and adapted to impart vibrations thereto.

20 8. A phonograph-horn having a non-metallic vibratory part or member continuous with the horn and composed of a different material from the main body of the horn, and a stylus adapted to impart vibrations to said part or member.

25 9. A phonograph-horn, having a non-metallic stylus attached directly to a side wall of said horn.

30 10. A phonograph-horn, having a non-metallic vibratory part located in the side of the horn, and a non-metallic stylus connected directly to said part.

35 11. A reproducing-horn, a part of said horn being under tension, and a stylus attached directly to said part under tension.

40 12. A phonograph reproducing device, the diaphragm of which is a curvilinear surface, and a stylus secured directly to said curvilinear surface.

45 13. A phonograph reproducing device, the diaphragm of which is a conical surface, and a stylus projecting from said surface and adapted to impart vibrations directly thereto.

50 14. A phonograph reproducing device consisting of a flexible horn and a stylus for imparting vibrations directly to said horn.

15. A phonograph reproducing device com-

prising a paper horn, having a stylus connected directly to the same near one end thereof. 45

16. A phonograph reproducing device comprising a non-metallic horn, having edges united along a longitudinal seam or joint, and a stylus secured directly to a part of the horn 50 laterally of the seam or joint.

17. A phonograph reproducing device comprising a non-metallic horn united detachably at its edges, and a stylus for imparting vibratory movement directly to a part of the horn. 55

18. A phonograph reproducing device comprising a horn, having a vibratory section in one side thereof, and a stylus for vibrating the section.

19. A phonograph reproducing device comprising a horn, having a vibratory diaphragm made of a different material from the body of the horn and extending around the same, and a stylus for vibrating the diaphragm.

20. A phonograph reproducing device having a vibratory curvilinear diaphragm at one end composed of a different material from the main body thereof, and a stylus attached rigidly to the diaphragm. 65

21. A phonograph-reproducer, having a vibratory conical member made of a different material from the body thereof, and a stylus for imparting vibrations to said member. 70

22. A sound-reproducer, comprising a horn having a stylus rigidly attached to the material of said horn and projecting therefrom intermediate its ends. 75

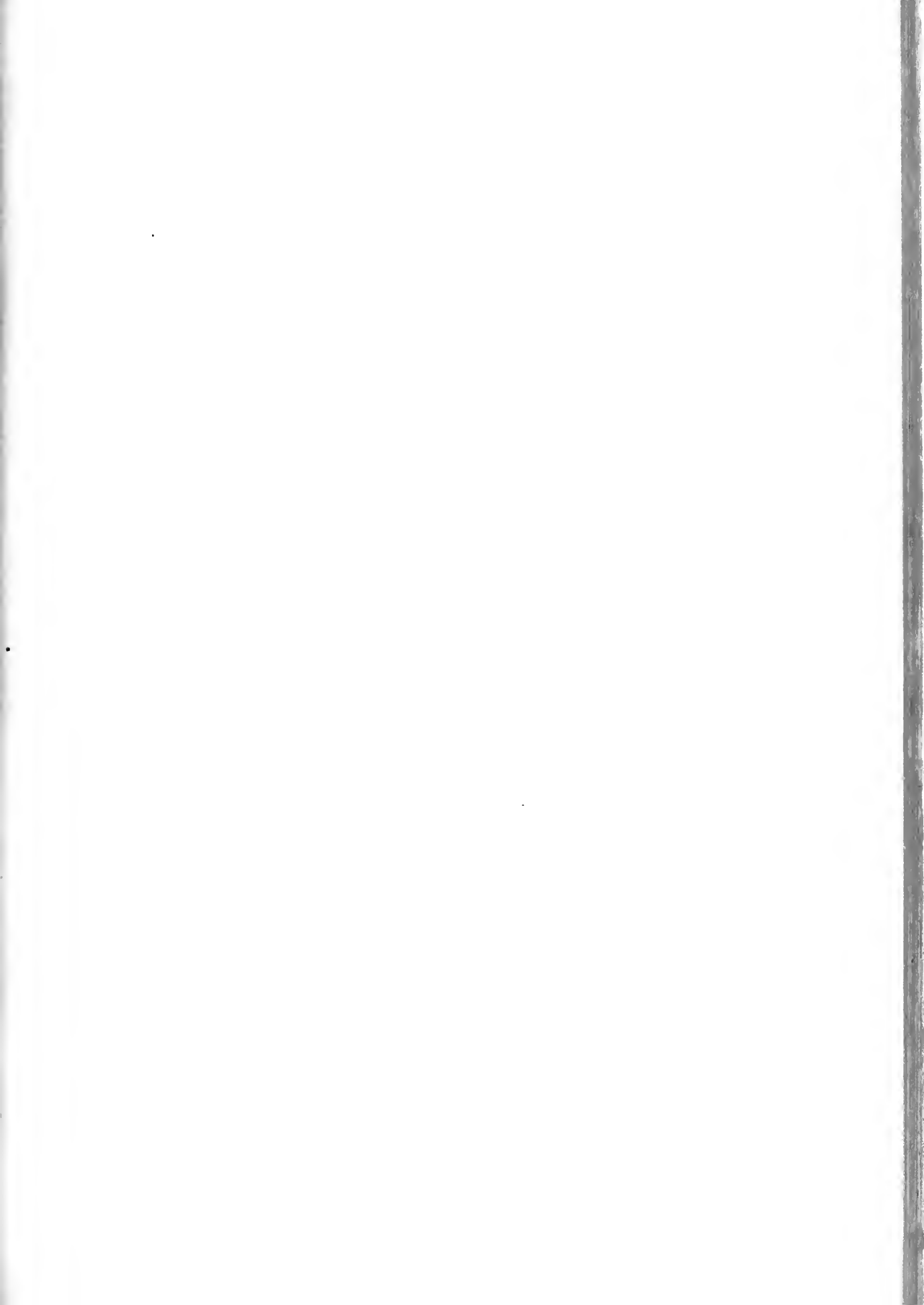
23. A sound-reproducer comprising a horn made of flexible material, and a stylus attached directly to said flexible material and projecting therefrom intermediate of its ends. 80

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

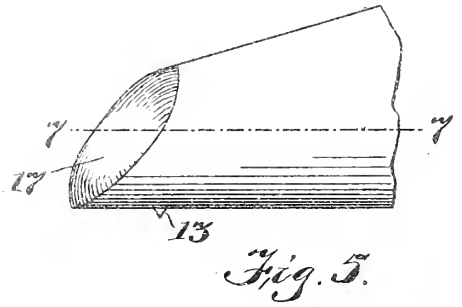
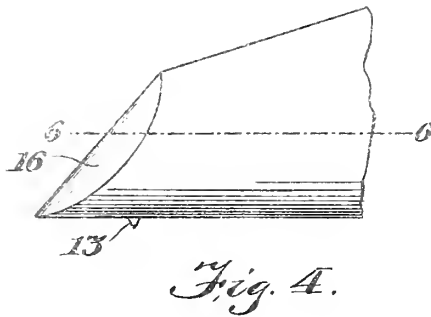
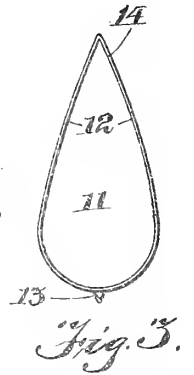
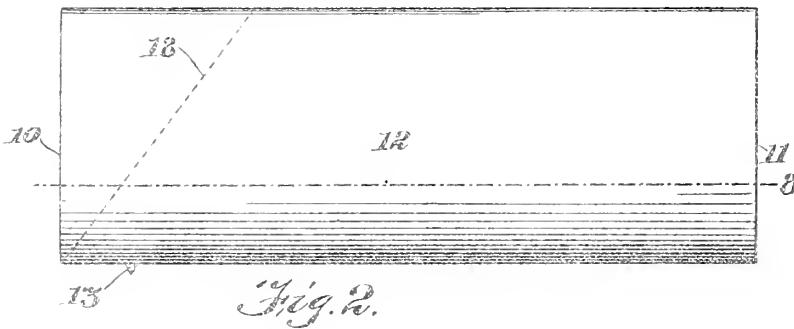
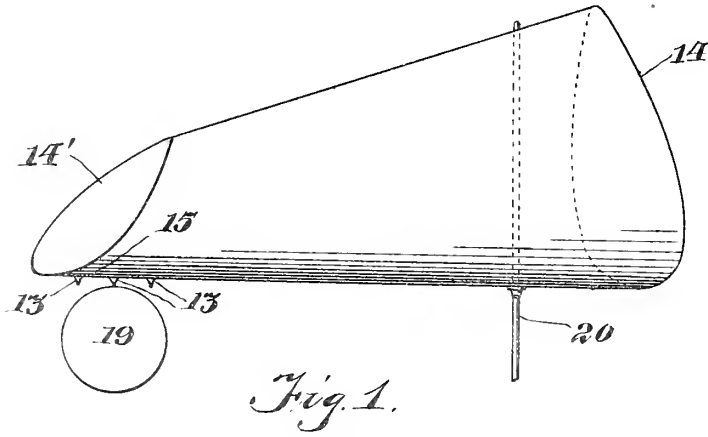
ROBERT HEAD.

Witnesses:

JAS. H. GRIFFIN,
EDWIN WALKER.



E. WALKER.
COMPOSITE SOUND PRODUCER.
APPLICATION FILED SEPT. 14, 1904.



WITNESSES:

Robert Head
V. E. Nichols.

INVENTOR
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COMPOSITE SOUND PRODUCER.
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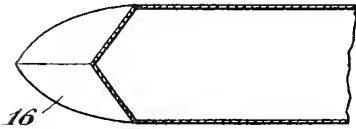


Fig. 6.

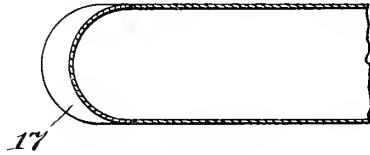


Fig. 7.

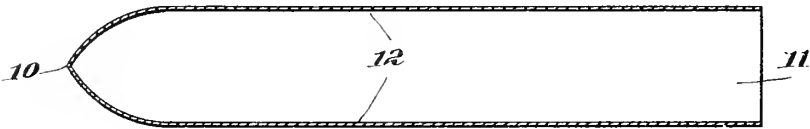


Fig. 8.

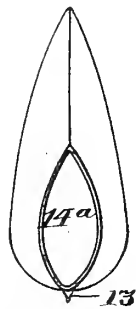


Fig. 9.

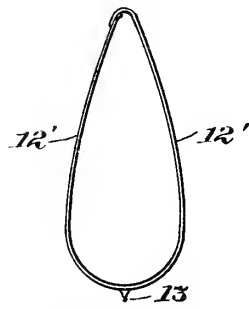


Fig. 10.

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ATTORNEYS.

UNITED STATES PATENT OFFICE.

EDWIN WALKER, OF ERIE, PENNSYLVANIA.

COMPOSITE SOUND-PRODUCER.

No. 805,600.

Specification of Letters Patent.

Patented Nov. 28, 1905.

Application filed September 14, 1904. Serial No. 224,466.

To all whom it may concern:

Be it known that I, EDWIN WALKER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Composite Sound - Producers, of which the following is a specification.

The ordinary phonograph, as is well known, comprises as essential elements thereof a record, a sound-reproducer for receiving vibrations from the record and creating sound-waves, and a horn or trumpet for collecting and disseminating the sound-waves thus produced.

The object of my invention is the production of an instrument embodying therein or capable of performing the joint functions of the sound-reproducer and horn of such a phonograph. In other words, I produce a single instrument which serves the dual purpose of the reproducer and horn. I am enabled thereby to not only dispense with the costly reproducer now employed, but to produce a much simpler and more economical machine, and yet one giving excellent results.

In accomplishing the object of my invention I employ what might well be termed a "vibrating horn"—that is, one composed of flexible material—and attach thereto a stylus, the material of both the horn and stylus being preferably non-metallic, whereby I am enabled to eliminate the metallic sound usually present in phonographs.

The invention will be more fully understood from the following detailed description thereof, taken in conjunction with the accompanying drawings, wherein—

Figure 1 is a perspective view of my invention. Fig. 2 is a modified form thereof in side elevation; Fig. 3, an end view of Fig. 2 in the direction of the arrow; Figs. 4 and 5, further modifications with parts of the horn broken away; Fig. 6, a section on line 6 6 of Fig. 4; Fig. 7, a section on line 7 7 of Fig. 5; Fig. 8, a section on line 8 8, Fig. 2; Fig. 9, a detail view showing the horn of Fig. 1 with an open end, and Fig. 10 a detail view showing a horn with its upper edge formed with a lapped joint.

The simplest type of my invention is shown in Figs. 2 and 3 and is made by folding any suitable material into substantially envelop form, closing one end thereof 10, leaving the other end 11 open, and preferably slightly compressing the side walls 12 12, so

as to produce a horn having substantially the cross-sectional shape illustrated in Fig. 3, this being approximately egg-shaped, although this particular shape is not material. 60

In Fig. 10 I have shown a horn with a slightly-rounded upper surface made by lapping the edge of one wall 12' over the edge of the other wall 12'.

Near the closed end 10 and preferably from one to three inches from the end I attach thereto a stylus 13, preferably of non-metallic material, such as glass. The particular manner of attaching the stylus to the horn forms no part of this invention; but such attachment may be accomplished manifestly in various ways, such as by cementing or riveting the stylus to the material of the horn. 70

In the construction shown in Fig. 1 the upper and lower edges of the horn diverge so as to produce an enlarged end 14. The plane of the other end 14' in my preferred form is inclined at an acute angle 15 to the bottom edge of the horn, and this end may be closed by a flat covering or piece, as shown in Fig. 1, by an angular piece, as shown in Figs. 4 and 6, or by a curved surface, as shown in Figs. 5 and 7. One function of this closure is to assist in holding the horn in the desired cross-sectional form. 85

The form of horn shown in Fig. 2 may have its end inclined also, as indicated by the dotted line 18, which end may be provided with any type of closure heretofore described. While I prefer to have the end near the stylus closed, as described, I can get very good results by allowing it to remain open, as shown by 14^a in Fig. 9. Further, while I prefer to have the end remote from the stylus open, yet, if it is desired to soften the tone of the instrument, this result may be accomplished by closing said end. 95

In Fig. 1 I have indicated the phonograph-record at 18 and the rod for supporting the end of the horn at 19. In Fig. 1 I have illustrated a plurality of styluses applied to the horn, and in practice I find it advantageous to place the first one about an inch from the end, the second one about an inch and a quarter from the first, and the third about an inch and a quarter from the second. I find that the volume and pitch of the sound varies according to the shape of the horn and the location of the stylus, the stylus nearest the end of the horn generally producing the loudest tones. Experience has shown that with 100 105 110

some records the best results are secured by utilizing the first stylus, while other records work better with one of the other styluses. It will be obvious that the several styluses may be so positioned that each will produce a pitch of a separate or different octave.

The horn may be made of any flexible material, preferably non-metallic, as stiff paper, celluloid, &c., but I have obtained very superior results by employing a quality of paper known in the trade as "press-board." If desired, the closure at the stylus end of the horn may be made of thinner material from that composing the body of the horn.

15 An instrument constructed as described is not only economical and simple, but produces clear, smooth, full, and well-rounded tones in contradistinction to the cramped, rasping, and metallic tones emanating from the ordinary phonograph. Furthermore, my instrument sends out its tones in all directions, whereas in the present machines the sound is emitted mainly from the open mouth of the horn and along lines substantially parallel with the axis thereof.

As another important commercial advantage of my invention I may state that a flexible horn of the shape specified is easily packed for shipment, and this is an item of very considerable importance, as the metallic horn usually employed must be packed with great care to prevent injury thereto.

While I have described the best form of my invention, it will be understood that many changes and additions may be made therein both as to shape and material without departing from the spirit thereof, and I reserve the right to make any and all of such variations.

40 Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A composite sound-producer having a horn of flexible material, the cross-sectional form of said horn, substantially throughout its entire length having a base of greater curvature than its top and a stylus attached to the base of the horn.

2. A composite sound-producer having a flexible horn approximately egg-shaped in cross-section throughout its entire length, one end of said horn being closed, and a stylus attached to the under side of the horn and near the closed end thereof.

3. A composite sound-producer having a horn of flexible material, said horn being approximately egg-shaped in cross-section for substantially its entire length and having one end thereof larger than the other, and a stylus attached to said horn, intermediate the ends thereof.

4. In a composite sound-producer a horn, the plane of one of the ends of which is inclined at an angle to the plane of the other end, and a stylus connected with said horn.

5. A horn having one of its ends in a plane inclined at an angle to the longitudinal axis of the horn, and a stylus connected with said horn.

6. A horn having one of its ends in a plane inclined at an angle to the longitudinal axis of the horn, and a closure for said inclined end.

7. A horn having one of its ends in a plane inclined at an angle to the longitudinal axis of the horn, and a flexible closure for said inclined end.

8. A horn having one of its ends in a plane inclined at an angle to the longitudinal axis of the horn, and a flexible closure for said inclined end, parts of which closure occupy different planes.

9. A composite sound-producer having a horn composed of flexible material and one of the ends of which is in a plane inclined to the longitudinal axis of the horn and a stylus intermediate the ends of the horn.

10. A composite sound-producer having a horn composed of flexible material, and a plurality of styluses attached to said horn and in substantially the same longitudinal plane.

11. A composite sound-producer having a horn composed of flexible material and a plurality of styluses intermediate the ends of the horn attached thereto and in substantially the same longitudinal plane.

12. A composite sound-producer having a horn composed of flexible material, said horn having a less area in cross-section above the horizontal plane of its longitudinal axis than the area below said plane for substantially the entire length of the horn, said horn being closed at one end.

13. A composite sound-producer having a horn composed of flexible material, said horn having a less area above the horizontal plane passing through its axis than below said plane, said horn being closed at one end and having a stylus attached to said horn.

14. A composite sound-producer comprising a horn, the body of which is made of thin press-board, one end of said horn being in a plane inclined at an angle to a horizontal plane passing through the axis of the horn, and a stylus attached to the horn near said inclined end.

15. A sound-reproducer provided with a plurality of styluses in substantially the same plane.

16. A sound-reproducer adapted for endwise movement, and provided with a plurality of styluses in substantially the same plane.

17. A sound-reproducer composed of flexible material and provided with a plurality of styluses, the latter being attached to said flexible material.

18. A flexible sound-reproducer having a plurality of styluses located at different points longitudinally of the reproducer.

19. A composite sound-producer consisting of a flexible horn having a plurality of styluses, located in different positions intermediate its ends.

5 20. A composite sound-producer comprising a flexible horn, having a plurality of styluses located at different positions longitudinally of the horn.

10 21. A composite sound-producer comprising a horn composed of flexible material and having a less area above the horizontal plane passing through its axis than below said plane, the material of the horn being lapped at the upper edge thereof.

22. A composite sound-producer comprising a horn composed of flexible material and having a less area above the horizontal plane passing through its axis than below said plane, the sides of the horn being arched in cross-section from the upper edge to the base thereof. 15 20

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN WALKER.

Witnesses:

JAS. H. GRIFFIN,

H. I. BERNHARD.

No. 805,787.

PATENTED NOV. 28, 1905.

G. FEIST & F. KRETZER.
PHONOGRAPH ATTACHMENT.

APPLICATION FILED APR. 5, 1905.

Fig. 1.

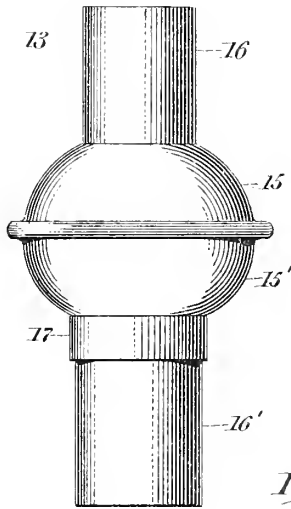


Fig. 2.

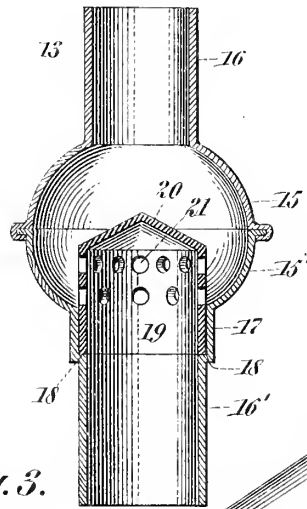


Fig. 3.

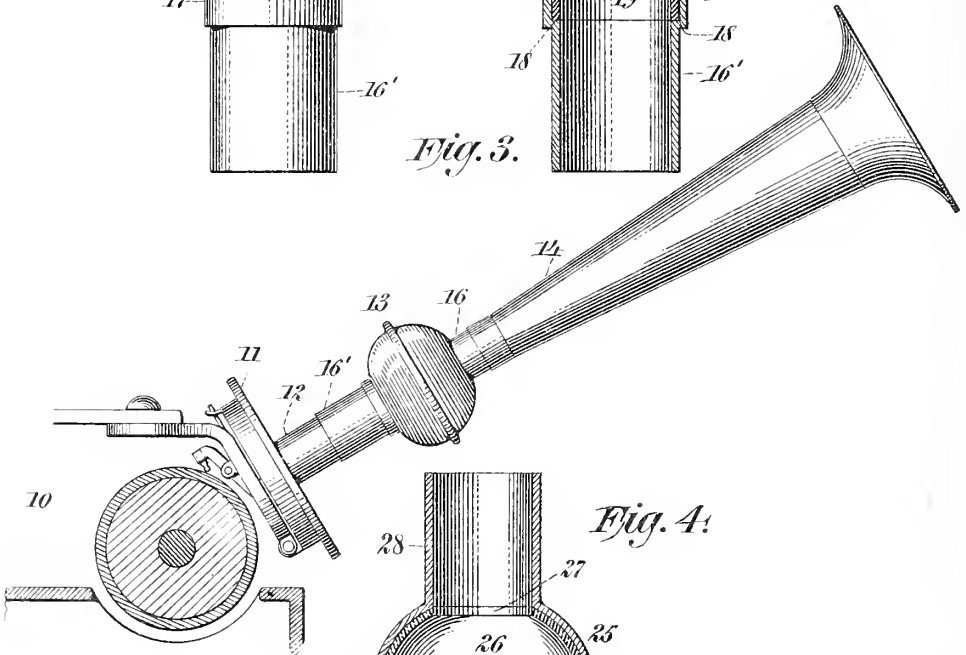
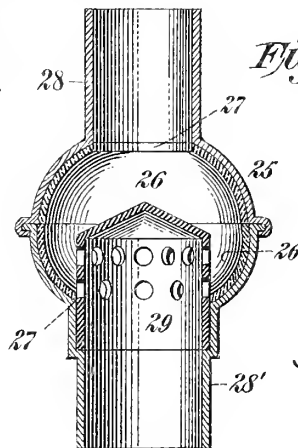


Fig. 4.



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Edwin H. Dietrich.

INVENTORS

George Feist
Frank Kretzer
BY
Walter Hasbrouck
their ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE FEIST AND FRANK KRETZER, OF NEW YORK, N. Y.

PHONOGRAPH ATTACHMENT.

No. 805,787.

Specification of Letters Patent.

Patented Nov. 28, 1905.

Application filed April 5, 1905. Serial No. 253,967.

To all whom it may concern:

Be it known that we, GEORGE FEIST, residing in the borough of the Bronx, New York county, and FRANK KRETZER, residing in the borough of Queens, Queens county, in the city and State of New York, citizens of the United States, have invented certain new and useful Improvements in Phonograph Attachments, of which the following is a full, clear, and exact specification.

Our invention relates to improvements in machines for transmitting or reproducing sound; and the same has for its object more particularly to provide a simple, inexpensive, and efficient apparatus which may be readily applied to a machine intermediate the reproducer and the horn, whereby the disagreeable scratching or rasping sound now produced in machines of this character may be entirely obviated or overcome, the sound rendered clearer and free from objectionable metallic qualities, and the character of the sound greatly improved.

To the attainment of these ends our invention consists in the novel details of construction and in the combination, connection, and arrangement of parts hereinafter more fully described and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, wherein like numerals of reference indicate like parts, Figure 1 is a side view, on an enlarged scale, of an apparatus constructed according to and embodying our invention. Fig. 2 is a central vertical section of the same. Fig. 3 is a side view, partly in section, showing a portion of a sound-reproducing machine with my apparatus applied thereto; and Fig. 4 is a central vertical section illustrating a modified construction.

In said drawings, 10 designates a phonograph of usual construction having a reproducer 11, provided upon its upper side with a centrally-disposed tubular extension 12, which is ordinarily adapted to receive and hold a horn. 13 denotes our apparatus, which is disposed intermediate the reproducer 11 and the horn 14.

The apparatus 13 consists of two hollow semispherical sections 15 15', made, preferably, of brass, which are secured together at their meeting edges by seaming the same, as shown, or in any other convenient manner, the two sections 15 15' when thus united forming a hollow spherical body.

From the top of the upper semispherical section 15 extends a tubular section 16, which is

secured to said spherical section 15 at its center and which may be made integral therewith or separate therefrom and thence secured thereto in any of the well-known ways, and 16' denotes a similar tubular section which depends from the center of the semispherical section 16' and has an enlarged top portion 17 where the same is joined to the under side of the semispherical section 16', the said enlarged portion 17 forming upon the inner surface of the tubular section 16', where it unites therewith, a shoulder 18.

Within the spherical body portion formed by the sections 16 16' is disposed a deflector consisting of a short hollow tubular portion 19, the lower end of which is firmly socketed and secured within the enlarged portion 17 of the tubular section 16', while its inner surface or wall forms, together with the inner surface of the tubular section 16', a smooth unbroken surface of uniform diameter. The upper end of said tubular portion, which extends upwardly within the spherical body to about the middle thereof, is provided with a conical top or head 20, and the side of said tubular portion 19, intermediate its conical head or top and the upper edge of the enlarged portion 17 of the tubular section 16', is provided with two rows of lateral circular openings 21.

In the modification illustrated at Fig. 4 the apparatus is constructed as hereinabove described and illustrated at Figs. 1 to 3, inclusive. In the present construction, however, the interior of the spherical body 25, which is made of brass or other suitable material, is provided with a lining consisting of two corresponding semispherical sections 26 26, composed of lead or other relatively soft material, which conform exactly to the inner surface of the semispherical sections forming the body 25 and are provided with circular openings 27 27, which register with the interior diameter of the tubular portions 28 28', respectively, extending from the upper and lower surface of the spherical body portion 25. Secured in the tubular portion 28' and extending upwardly into the body portion 25 is a deflector 29, constructed as hereinabove described.

In operation the sound as it issues from the reproducer will pass into the tubular section 16' of the apparatus, thence into the deflector, where the same will strike against the inner surface of the conical head 20 and be deflected and issue through the lateral side openings 21 in said deflector. Hereupon the sound will

be reflected against and from the inner surface or wall of the spherical body portion 15 of the apparatus and thence pass therefrom through the tubular section 16 and into the contracted portion of the horn 14 and after 5 passing through the horn issue from its mouth.

By means of our apparatus the sound is so retarded and reflected that the harshness or rasping occurring in instruments not provided 10 with the same is obviated and a pure musical and non-metallic sound thereby insured. By the use of a relatively soft lining within the spherical body 25, as illustrated at Fig. 4, the tone qualities in instances, for example, where 15 the tones of the brass instruments are sought to be reproduced will be materially enhanced.

Without limiting ourselves to the precise details of construction, which may be varied within the scope of the invention, what we 20 claim, and desire to secure by Letters Patent, is—

1. An apparatus for the purposes specified, comprising a hollow body, means for attaching the same to a sound-reproducing apparatus and a horn, a tubular portion closed at 25 one end arranged in said hollow body, and openings in said tubular portion, substantially as specified.

2. An apparatus for the purposes specified 30 comprising a hollow body, means for attaching the same to a sound-reproducing apparatus and a horn, a tubular portion closed at one end, extending into said hollow body from the receiving end thereof, and openings in 35 said tubular portion, substantially as specified.

3. An apparatus for the purposes specified comprising a hollow body, tube-sections secured thereto and communicating with the interior of said hollow body, and a tubular portion 40 closed at one end arranged in said hollow body, and communicating with one of the tube-sections, and openings arranged in said tubular portion, substantially as specified.

4. An apparatus for the purposes specified 45 comprising a hollow spherical body, tube-sections secured thereto and communicating with the interior of said hollow body, and a tubular portion closed at one end arranged in said hollow spherical body and communicating 50 with one of said tube-sections at its junction with the hollow spherical body, and apertures arranged in said tubular portion, substantially as specified.

5. An apparatus for the purposes specified 55 comprising a hollow, spherical body, tube-sections secured thereto opposite to each other, and communicating with the interior of said hollow, spherical body, and a tubular portion secured at one end to one of said tube-sections, and extending into said hollow, spherical 60 body, and provided at its inner end with a conical top, and lateral openings, substantially as specified.

6. An apparatus for the purposes specified

comprising a hollow spherical body consisting 65 of two corresponding semispherical sections united at their edges, tube-sections extending from the top and bottom of said spherical body and communicating with the interior thereof, and a tubular portion secured at one end with- 70 in one of the tubular sections aforesaid and extending into said hollow spherical body, said tubular portion being closed at its upper end and provided with openings in its side below said closed upper end, substantially as 75 specified.

7. An apparatus comprising a hollow, spherical body consisting of two corresponding semispherical sections united at their meeting 80 edges, tube-sections secured to and extending outwardly in opposite directions from said hollow, spherical body, and communicating with the interior thereof, a deflector arranged within said hollow, spherical body consisting of a tubular portion secured at its lower end 85 to one of the tubular sections extending outwardly from said hollow spherical body, and its other end extending upwardly into said hollow, spherical body, said tubular portion having a conical head or top, and lateral open- 90 ings in its side below said conical head or top, substantially as specified.

8. An apparatus for the purposes specified, comprising a hard hollow, spherical body, a relatively soft lining therefor, tube-sections 95 secured to and extending outwardly in opposite directions from said hollow, spherical body, and a deflector arranged within said hollow, spherical body, and communicating directly with one of the tubular sections thereof, 100 substantially as specified.

9. An apparatus for the purposes specified comprising a hollow, spherical body consisting of two corresponding semispherical metal 105 sections united at their meeting edges, a lining for said hollow, spherical body consisting of two corresponding semispherical sections, composed of a relatively softer metal, and conforming in shape to the interior surface of said hollow, spherical body, two sections secured 110 to said hollow, spherical body, and communicating with the interior thereof, and a deflector disposed within said hollow, spherical body consisting of a tubular portion secured at its lower end within one of the tubular sections 115 aforesaid, said tubular portion having a conical head or top and circular openings in its side below said head or top, substantially as specified.

Signed at the city of New York, in the county 120 and State of New York, this 9th day of February, 1905.

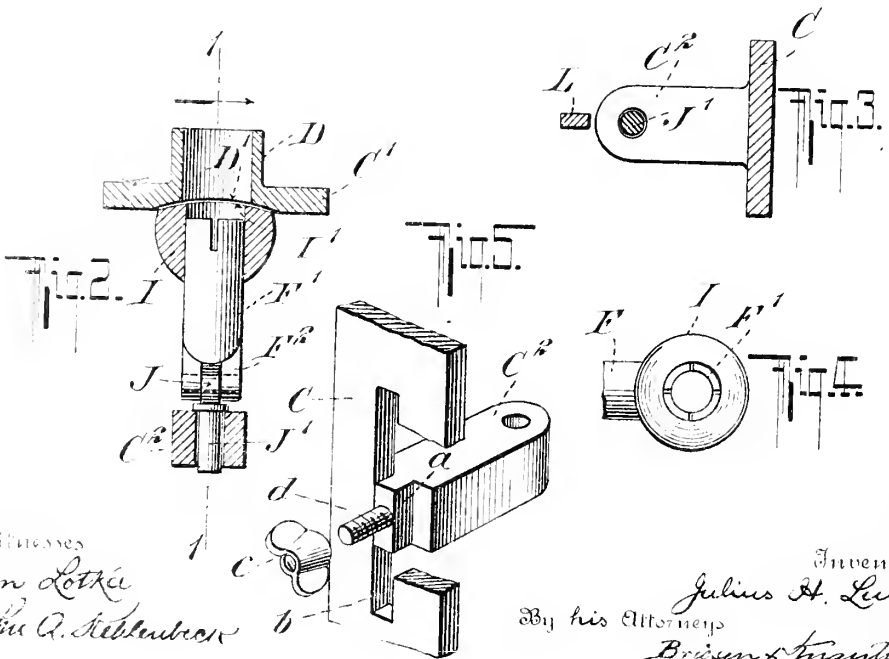
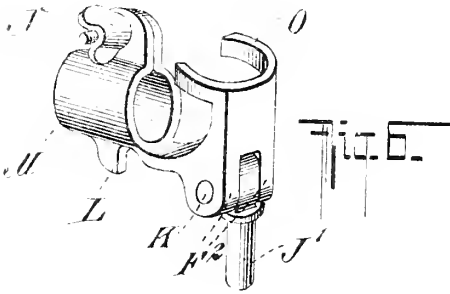
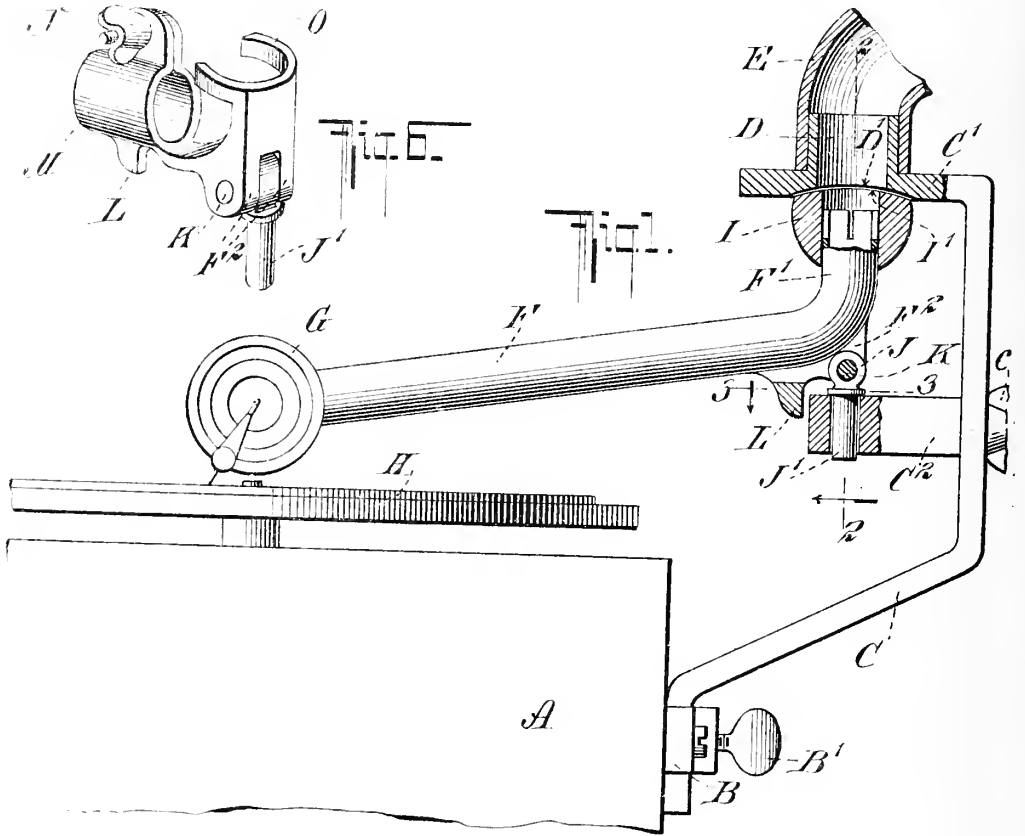
GEORGE FEIST.
FRANK KRETZER.

Witnesses:

CONRAD A. DIETERICH,
JOSEPH G. QUINN, Jr.



J. H. LUTZ.
TALKING MACHINE ATTACHMENT.
APPLICATION FILED JAN. 19, 1905.



Witnesses
John Lotka
Wm. A. Kellum

Inventor
Julius H. Lutz
By his Attorneys
Brisson & Smith.

UNITED STATES PATENT OFFICE.

JULIUS H. LUTZ, OF NEW YORK, N. Y., ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE ATTACHMENT.

No. 805,923.

Specification of Letters Patent.

Patented Nov. 28, 1905.

Application filed January 19, 1905. Serial No. 241,732.

To all whom it may concern:

Be it known that I, JULIUS H. LUTZ, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Talking-Machine Attachments, of which the following is a specification.

My invention relates to machines commonly known as "talking-machines," and has for its object to provide a simple and efficient device for supporting the sound-conductor which is usually employed for conveying the sound from the vibrating diaphragm to the amplifying-horn; and the object of my invention is to so arrange the said support that the reproducer may freely swing in a horizontal plane and at the same time to permit a vertical movement of the said reproducer to follow any up-and-down movement or wobbling of the record and to always maintain the said reproducer in correct position in relation to the record. With my device it is also possible to readily and easily remove the sound-conductor, together with the reproducer, from the machine.

Other objects of invention will appear from the detailed description, and the features of novelty will be pointed out in the appended claims.

Referring to the drawings, which illustrate a specific embodiment of my invention, Fig. 1 is a side elevation of so much of a talking-machine as is necessary to explain my invention. Fig. 2 is a sectional view of the same on line 2 2 of Fig. 1. Fig. 3 is a horizontal section on the line 3 3 of Fig. 1. Fig. 4 is a plan view of a portion of the sound-conducting tube. Fig. 5 is a perspective view of the supporting-bracket, and Fig. 6 is a detail view of another form of joint.

A represents a portion of the talking-machine, which is provided in a convenient location—as, for instance, on one side—with a socket B, into which is adapted to project one end of the bracket C, the said bracket C being secured in position in the socket B by means of a set-screw B'. The bracket C at its upper or free end is bent into a substantially horizontal flange, as shown at C', the said portion C' being provided with a neck or projection D, upon which is adapted to be placed the end of the amplifying-horn E. The sound-conducting tube F carries at its one

end the reproducer G, which coöperates with the sound-record H, which may be of any suitable construction and may be driven in any convenient manner. The tube F is bent into a substantially upright portion F', said upright portion F' being split at its upper end to receive and accommodate a rounded member I', having a spherically-convexed surface I, which coöperates with a corresponding concave surface D' on the portion C' of the bracket C. At the bend of the tube are located lugs F², between which extends an eyelet J, provided with a rounded stem J', projecting into a member C² of the bracket C. A pivot K extends through the lugs F² and the eyelet J, thus forming a hinge which permits the reproducer and the tube F to swing in a vertical plane, the stem J' serving as a pivot to permit the reproducer to swing in a horizontal plane. The curve I' and the curve D' are each struck from the center of the pivot K, so that the tube F is free to swing in a vertical plane to a certain extent without breaking the connection between said tube F and the amplifying-horn E. It will be noticed that the diameter of the upright portion F' of the tube F is smaller than the diameter of the projection D and of the amplifying-horn E, so that there are no obstructions to the free passage of the sound from the tube through the horn to the outside air.

The member C² may be provided with a reduced angular portion α , which fits into a slot β of the bracket C, so that the said member C² is adjustable upon said bracket C, being held in any position by a thumb-screw c , screwing upon a screw-threaded stem d of the member C², as clearly shown in Fig. 5. With this construction it is not necessary for the parts to be made as accurately as would be the case if this member C² were not adjustable.

The rounded member I and the tube F might be made in one section instead of separately, as shown.

To prevent the reproducer and the tube from dropping too far when the record is not in position or when the tube and reproducer are swung aside, I provide a stop L, which abuts against the member C² and prevents the said tube F and reproducer from dropping too far. In order to secure a proper engagement of the stop L with the edge of the bracket member C² in their position of said stop, the said edge is given the shape of an arc of a circle,

the center of which is upon the axis of the vertical stem J' . (See Fig. 3.)

When it is desired to remove the tube F and the parts attached thereto, together with the reproducer G , from the machine, the said tube F is swung at substantially right angles to the position shown in Fig. 1 and then tilted up until the upright portion F is free from the portion C' , whereupon the tube F , with attached parts, may be easily lifted from the member C^2 until the stem J' is free from said member C^2 and then completely removed.

When it is not desired to make the tube F , the lugs F^2 , and the stop L in one piece, I may provide a separate device, such as illustrated in Fig. 6. In this case the collar M is sprung around the tube F , near the bend thereof, and secured in position by the thumb-screw N , it being understood that the band O snaps around the upright portion F' of the tube F . The lugs F^2 , the stem J' , with the eyelet J , and the pivot K , are secured to this band O and also fastened to the collar M . The stop or lug L in this case is also secured to or forms part of the collar M . This device is easily adjustable upon the tube and affords an efficient substitute when for any reason it is not convenient or desirable to make the tube F , the lugs F^2 , and stop or lug L in one piece.

It will be seen that with my device as described the reproducer is free to swing in a horizontal plane, the stem J' acting as a pivot, and is also free to swing in a vertical plane upon the pivot K , while at the same time the reproducer is held upright and is prevented from wobbling, and thus losing in efficiency.

Various modifications may be made without departing from the nature of my invention.

While the drawings show the member C^2 adjustable vertically on bracket C , such adjustable construction is not absolutely necessary, and the member C^2 may form a rigid part of the bracket, if desired.

I claim as my invention and desire to secure by Letters Patent—

1. An attachment for talking-machines comprising a stationary support or bracket having a spherically-concaved surface with a central aperture for the escape of the sound, a sound-conducting tube provided at one end with a spherically-convexed member arranged to swing adjacent to said concave surface, a reproducer at the other end of said tube, a vertical stem or spindle pivoted to a member of said bracket, said member having an edge concentric with said stem, and said tube having a stop adapted to engage said edge, and a horizontal pivot connecting said stem with said tube.

2. An attachment for talking-machines comprising a stationary member having a spherically-concaved surface and an aperture therein for the escape of the sound, a sound-conducting tube, a spherically-convexed member adjustably fitted on one end of said tube adjacent to said convexed surface, a reproducer carried by the other end of said tube, and a universal joint for supporting said tube.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JULIUS H. LUTZ.

Witnesses:

JOHN LOTKA,
JOHN A. KEHLENBECK.



J. JETTER.

SOUND BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

APPLICATION FILED OCT. 1, 1904.

Fig. 1.

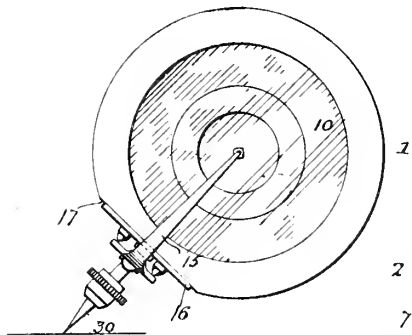


Fig. 2.

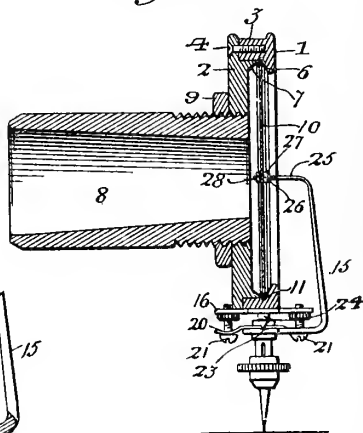


Fig. 4.

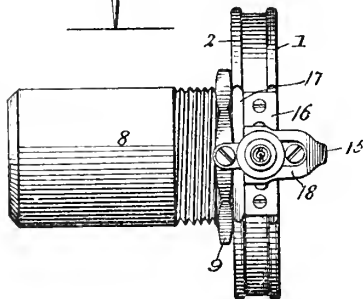
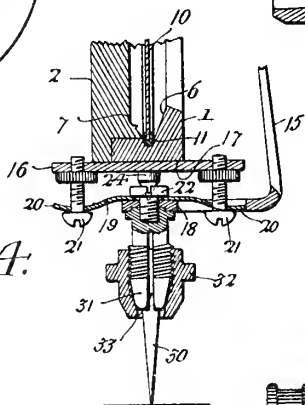
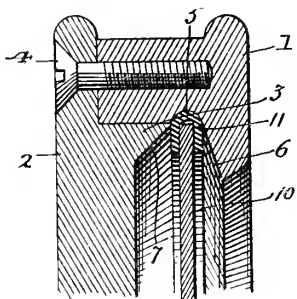


Fig. 3.

Fig. 5.



Witnesses:
Titus N. Jones
Augustus B. Coppes

Inventor:
Julius Jetter
 by his Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

JULIUS JETTER, OF CAMDEN, NEW JERSEY, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO NONPAREIL MACHINE MANUFACTURING COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

No. 805,964.

Specification of Letters Patent.

Patented Nov. 28, 1905.

Application filed October 1, 1904. Serial No. 226,850.

To all whom it may concern:

Be it known that I, JULIUS JETTER, a citizen of the United States, and a resident of Camden, New Jersey, have invented certain Improvements in Sound-Boxes for Sound Recording and Reproducing Machines, of which the following is a specification.

My invention consists of certain improvements in connection with the sound-box of graphophones or phonographs or other sound recording and reproducing machines, more commonly known as "talking-machines," the object of my invention being to improve the character of sound produced by an improved arrangement of certain details of construction of the sound-box, the stylus-lever and its mounting, and the manner of mounting the diaphragm.

My invention is fully shown in the accompanying drawings, in which—

Figure 1 is a front elevation of a sound-box made in accordance with my invention. Fig. 2 is a sectional view of the same, taken on the line *a a*, Fig. 1. Fig. 3 is an elevation of a box, showing the stylus-carrying mechanism; and Figs. 4 and 5 are enlarged sectional views of part of Fig. 2.

In the drawings, 1 represents one part, substantially an annular ring, and 2 the other part, substantially a cap-piece, of the sound-box of a sound recording and reproducing machine. The cap-piece has a flange 3, fitting into said annular ring, which is constructed to receive it, the two parts being held together by screws 4. The annular ring is provided with an internal annular groove or recess 5 (clearly shown in Fig. 4) for a purpose to be described. The parts 1 and 2 are beveled at 6 and 7, respectively, such beveled portions flaring outwardly from the groove or recess 5 when the parts are fitted together.

A tubular extension 8 may be provided to which the usual horn may be attached, and this extension may be screwed into the part 2 of the sound-box casing and held by means of a lock-nut 9 or applied in any other suitable manner.

The diaphragm of the sound-box is indicated at 10, and this is substantially equal in diameter to the interior of the annular ring 1. In mounting this diaphragm I provide an insulating-washer 11, which engages the edge of the same, and thereby prevents contact of said

diaphragm with any portion of the sound-box casing. The washer may be of any suitable material and may comprise simply a tube of sufficient length to encircle the diaphragm and split, so as to engage the edge of the same. This washer when in place fits and is relatively retained by the annular groove or recess 5 of the ring 1, as clearly shown in Fig. 4. The diaphragm is held in place by the contact of the flange 3, carried by the cap-piece 2, said flange engaging the washer in line with the peripheral edge of the diaphragm, the latter being thereby positively confined against lateral movement and thoroughly insulated from the metal of the sound-box.

The stylus-lever is indicated at 15 and is connected to a plate 16, secured to the periphery of the annular ring 1, the latter being flattened at 17 for the purpose. The stylus-lever is bent, as shown, and its portion 18 is connected to the plate 16 by means of a spring 19, having ends 20, which are confined by screws 21, the central portion of said spring being secured to the extension 18 of the stylus-lever by means of a screw 22. The spring may be of any character desired; but I have shown one having curved extensions engaged by the screws 21. This portion 18 of the stylus-lever is fulcrumed in line with the diaphragm, its under surface being grooved at 23 for the engagement of the points 24, carried by the plate 16. By alternately tightening and loosening the screws 21 the tension of the stylus-lever with respect to the diaphragm may be regulated as desired. The opposite end 25 of the stylus-lever is bent at right angles to its general length and is passed through the diaphragm. This end is threaded at 26, as shown, and nuts 27 and 28 are applied to the same, so as to confine it positively to the diaphragm and at the same time permit adjustment.

The stylus-point is shown at 30, and this is carried by a stem 31 and secured to said stem by a clamping member or sleeve 32. The stem 31, receiving the stylus-point, is split at 33, and as the clamping member 32 is screwed over the same after the stylus-point has been inserted the parts of the stem are pressed together, holding said stylus-point firmly in place.

It will be noticed that the washer I have provided embraces the edge of the diaphragm,

so that there is no danger of the latter coming in contact with the metal of the sound-box. The means I provide for retaining such diaphragm engage said washer in line with the peripheral edge of the diaphragm, leaving the greater part of the washer free, and I bevel the meeting parts of the sound-box adjacent to the washer. By this means the diaphragm is retained firmly in place; but its movements due to the vibration of the stylus-lever are freer, as the washer may give laterally, its greater part being unconfined by the sound-box.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A sound-box for sound recording and reproducing machines, comprising a ring having an internal annular groove or recess, a cap-piece fitting said ring and secured thereto, a diaphragm held between said ring and cap-piece, and a washer for the peripheral edge of said diaphragm, the outer edge of said washer being disposed in the annular groove or recess of the ring.

2. In a sound-box for sound recording and reproducing machines, the combination with a ring and a cap-piece forming the sound-box, the former having an internal annular groove or recess, of a diaphragm, and a washer embracing the edge of said diaphragm, said washer having a portion fitting the internal annular groove or recess.

3. In a sound-box for sound recording and reproducing machines, the combination of a ring forming one portion of the box, said ring having an internal annular groove or recess, a cap-piece forming the other portion of the box, a diaphragm held between said members, a washer embracing the edge of said diaphragm, and a flange carried by the cap-piece and arranged to engage said washer in line with the peripheral edge of the diaphragm, the outer edge of said washer fitting said internal annular groove or recess.

4. A sound-box for sound recording and reproducing machines, comprising a ring having an internal annular recess, said member being beveled outwardly from said recess, a cap-piece fitting said ring and secured thereto, said cap-piece having a beveled engaging rim, a diaphragm held between said parts, and a washer for said diaphragm, also confined between said parts and extending into the internal annular recess of the ring.

5. In a sound-box for sound recording and reproducing machines, the combination of a ring forming one portion of the box and having an internal annular recess, a cap-piece forming the other portion of the box and fitting said ring, a diaphragm held between said members, the latter being beveled outwardly from said diaphragm, an insulating-washer embracing the edge of said diaphragm, said washer having its outer portion disposed within the internal annular recess of the ring, and

a flange carried by the cap-piece and arranged to engage said washer in line with the peripheral edge of the diaphragm.

6. In a sound-box for sound recording and reproducing machines, the combination of a ring forming one portion of the box and having an internal annular groove, a cap-piece forming the other member of the box and having a beveled flange fitting said ring, a diaphragm confined between said parts, and a washer embracing the edge of said diaphragm and adapted to rest in the groove of the ring, the flange of the cap-piece engaging said washer in line with the peripheral edge of the diaphragm.

7. In a sound-box for sound recording and reproducing machines, the combination of a ring forming one member of the box and having an internal annular groove or recess, a cap-piece forming the other member of the box and having a flange fitting said ring, a diaphragm confined between said parts, and a washer embracing the edge of said diaphragm, the outer edge of which washer rests in the annular groove of the ring, the flange of the cap-piece engaging said washer in line with the periphery of the diaphragm, and said flange and ring being beveled or flared outwardly from the annular groove or recess to permit movement of the washer due to the undulations or vibrations of the diaphragm.

8. In a sound-box for sound recording and reproducing machines, the combination of a ring forming one member of the box and having an internal annular groove or recess, a cap-piece forming the other member of the box and having a flange fitting said annular ring, a diaphragm confined between said parts, a washer embracing the edge of said diaphragm, the outer edge of which washer rests in the annular groove of the ring, the flange of the cap-piece engaging said washer in line with the periphery of the diaphragm, and said flange and ring being beveled or flared outwardly from the annular groove or recess to permit movement of the washer due to the undulations or vibrations of the diaphragm, a stylus-lever connected to the outer surface of the box at one end and to the diaphragm at the other, pivot-points mounted on the casing in line with the diaphragm and engaging the stylus-lever, and an adjustable spring arranged between the stylus-lever and the casing whereby said lever may be rocked on said points to increase or diminish the tension on the diaphragm.

9. In a sound-box for sound recording and reproducing machines, the combination of the box proper, a stylus-lever connected thereto, a diaphragm, said stylus-lever having an integral bent and threaded end passed through the diaphragm, and nuts engaging said threaded end and disposed on both faces of the diaphragm to lock the stylus-lever thereto.

10. In a sound-box for sound recording and

reproducing machines, the combination of a ring having an inner beveled surface, a cap-piece having an inner beveled surface, and a diaphragm confined between said parts, said diaphragm being confined at its periphery adjacent to said beveled portions, the latter permitting undulations or vibrations of said diaphragm.

11. In a sound-box for sound recording and reproducing machines, the combination of a ring having an inner beveled surface and an internal annular groove or recess, a cap-piece having an inner beveled surface, a diaphragm confined between said parts, and a washer for

said diaphragm held by said parts, the beveled portions of the members composing the box being so disposed as to permit expansion of the washer due to the undulations or vibrations of the diaphragm, and the outer edge of said washer fitting within the internal annular groove or recess of the sound-box.

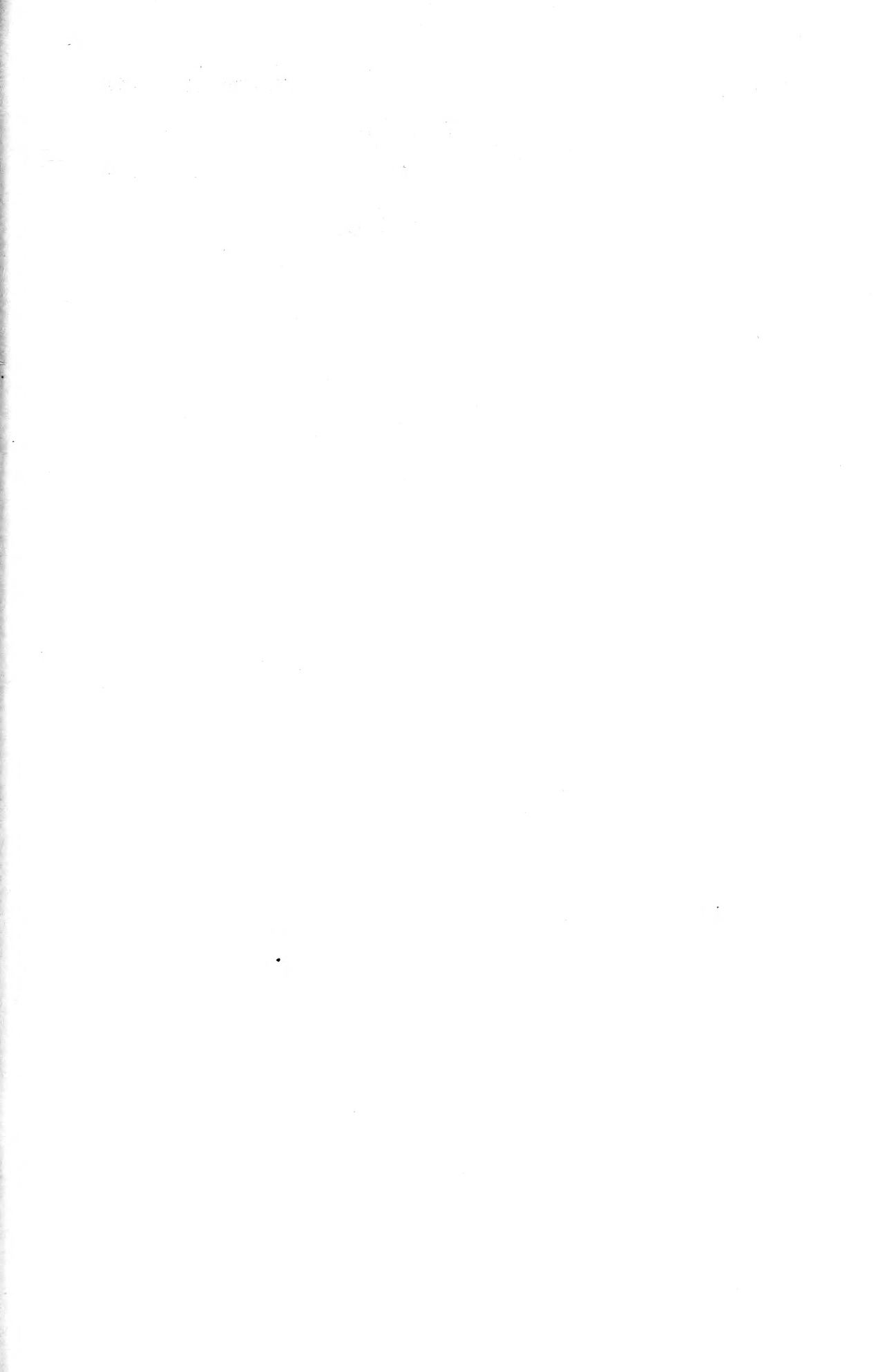
In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JULIUS JETTER.

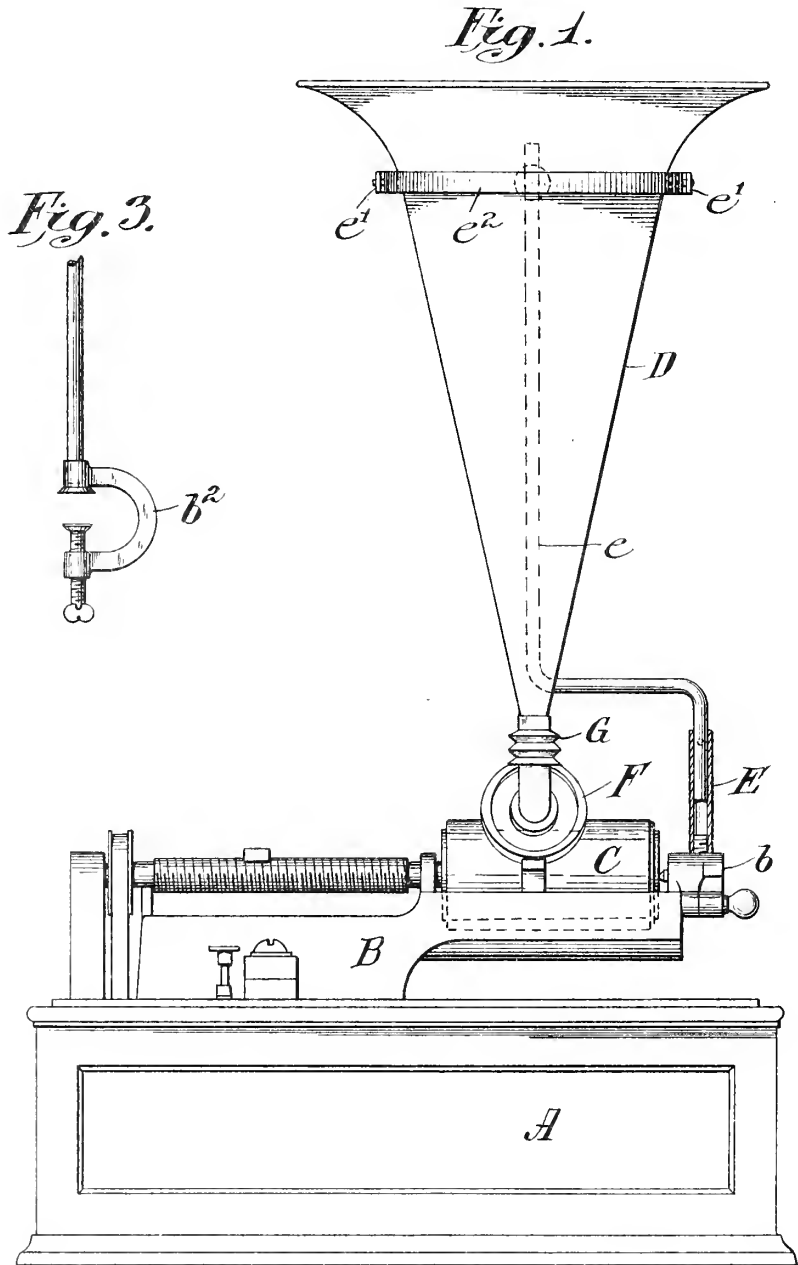
Witnesses:

MURRAY C. BOYER,
JOS. H. KLEIN.





V. H. RAPKE.
TALKING MACHINE.
APPLICATION FILED FEB. 18, 1905.

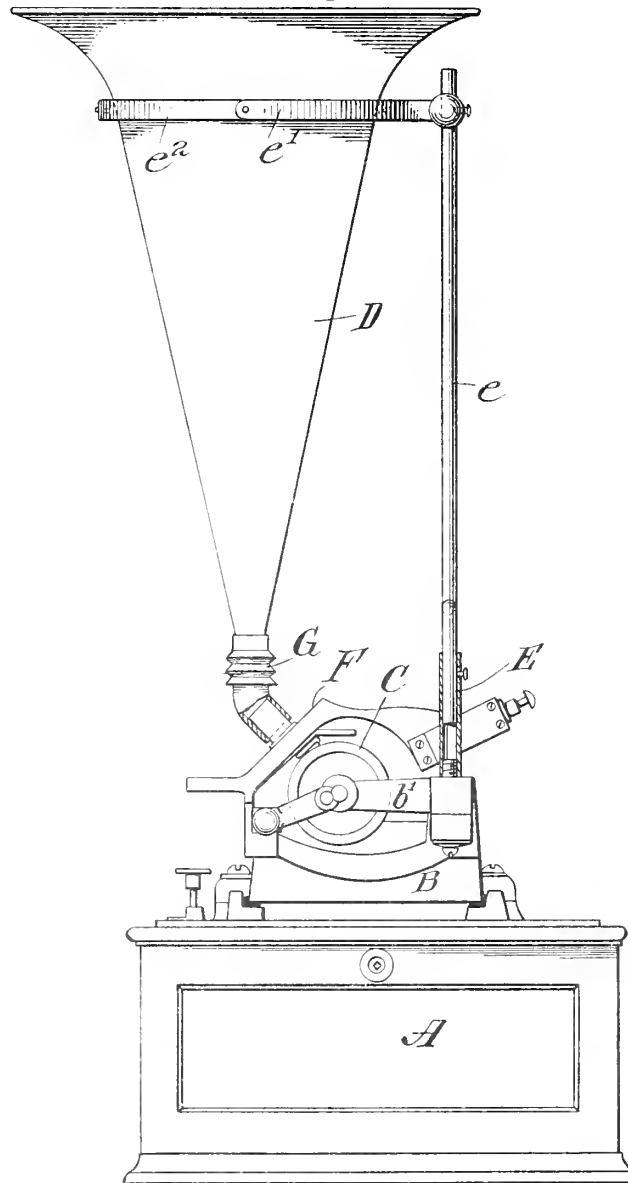


Attest:
F. Alexander
W. B. Hardley

Inventor:
Victor H. Rapke,
by F. W. Barker Atty.

V. H. RAPKE.
TALKING MACHINE.
APPLICATION FILED FEB. 18, 1905.

Fig. 2.



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V. H. RAPKE.
TALKING MACHINE.

APPLICATION FILED FEB. 18, 1905.

5 SHEETS—SHEET 3.

Fig. 4.

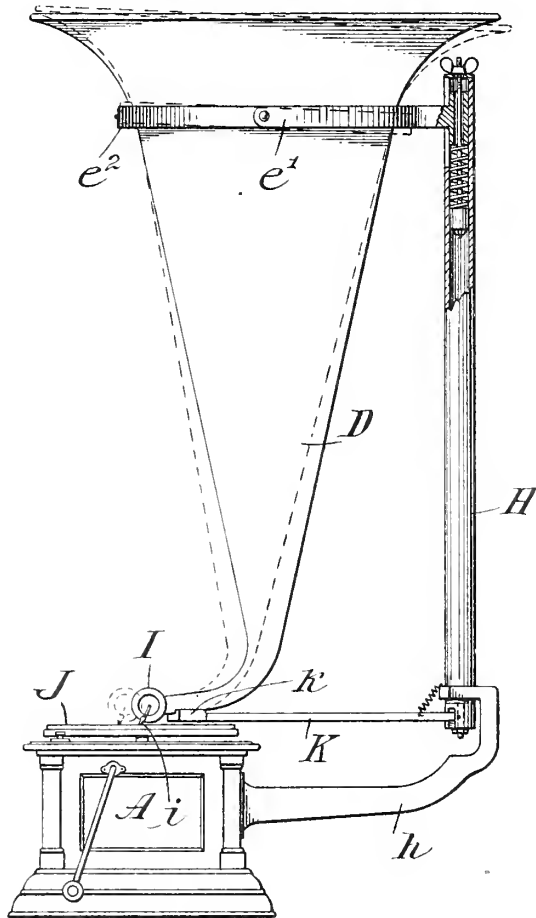
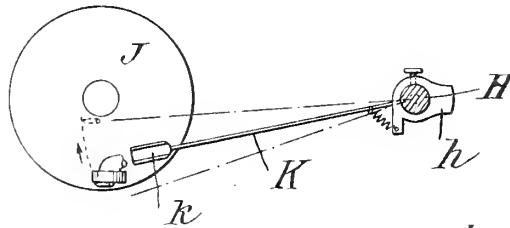


Fig. 5.



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F. Alexander
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Inventor:
Victor H. Rapke
by *J. W. Barber* Atty.

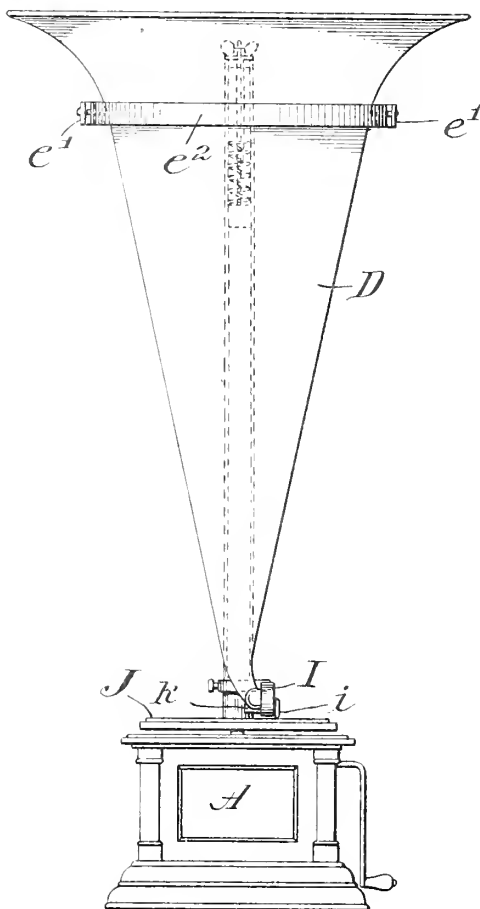
No. 806,289.

PATENTED DEC. 5, 1905.

V. H. RAPKE.
TALKING MACHINE.
APPLICATION FILED FEB. 18, 1905.

5 SHEETS—SHEET 4.

Fig. 6.



Attest:
F. Alyanick
H. B. Hardley

Inventor:
Victor H. Rapke
by F. W. Baker Atty.

V. H. RAPKE.
TALKING MACHINE.
APPLICATION FILED FEB. 18, 1905.

Fig. 7.

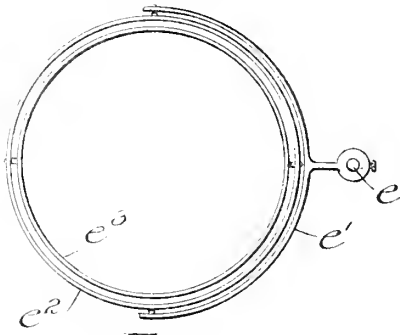


Fig. 8.

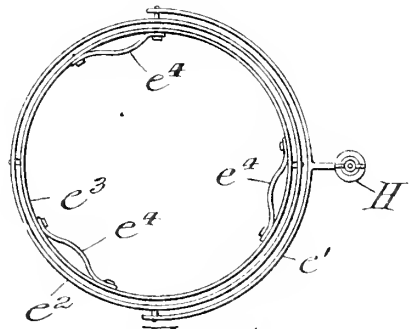


Fig. 9.

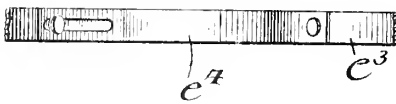


Fig. 10.



Fig. 12.

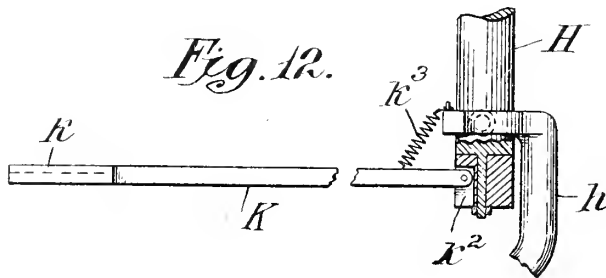
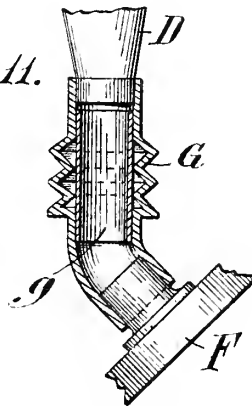


Fig. 11.



Attest:
A. Alexander
W. B. Wardley

Inventor:
Victor H. Rapke
by J. W. Barker, Atty.

UNITED STATES PATENT OFFICE.

VICTOR H. RAPKE, OF NEW YORK, N. Y.

TALKING-MACHINE.

No. 806,289.

Specification of Letters Patent.

Patented Dec. 5, 1905.

Application filed February 18, 1905. Serial No. 246,229.

To all whom it may concern:

Be it known that I, VICTOR H. RAPKE, a citizen of the United States, residing at 1661 Second avenue, in the borough of Manhattan, in the city, county, and State of New York, have invented a new and useful Improvement in Talking-Machines, of which the following is a specification.

This device relates to that class of devices variously known as "phonographs" and "talking-machines;" and the objects of my improvements are to arrange the horns used with such instruments in a novel manner, whereby an improved result is attained, and to provide certain supporting and interconnecting devices to promote efficiency in the operation of the apparatus.

In the course of my experiments with machines of the above-noted character following endeavors to improve the quality of the sound reproductions therefrom I have discovered that by arranging the sound-magnifying horn in manner to discharge the sound-waves upwardly instead of following the usual practice of directing the horn toward the audience the result achieved is that a greatly-improved quality of sound finally reaches the audience.

The manner in which I account for the improved effect is that the sound-waves ascend to the ceiling of the room in which the machine is operated, which reflects said sound-waves downwardly as from a sounding-board, they being evenly diffused in their descent and losing that harshness incident to their delivery in a direct, and therefore more concentrated bombardment.

Furthermore, in prosecuting my endeavors to improve the operation of these devices I have devised means adapted for use with a record-making apparatus as well as with a reproducing-machine, whereby the contacting stylus may bear against the record with exactly that degree of pressure requisite to produce the best results, and whereby the effects of external or foreign vibrations are nullified.

With the above-noted objects in view the leading features of my invention may be briefly characterized as follows: first, the provision of means whereby a sound-magnifying horn may be supported in an approximately upright position from a phonograph or talking-machine; second, supporting means for a horn of a phonograph or talking-ma-

chine whereby such horn is sustained in an approximately upright position and is capable of universal movement in a horizontal plane at its lower end; third, in a phonograph, a hollow tubular connection between the horn and sound-box capable of yielding without imparting a tensional retarding influence to the sound-box in the horizontal movement of the latter; fourth, means for tensionally supporting a horn and attached sound-box from a talking-machine and adjustably counterbalancing the major portion of its weight; fifth, tensionally-supported means for guiding a suspended horn in its traverse over a disk; sixth, a connection between a horn and sound-box and guiding means therefor of a character avoiding the employment of joints and angles in the sound-passage.

In the drawings accompanying this application, Figure 1 is a front view of a phonograph with a horn supported in an upright position. Fig. 2 is a side elevation thereof. Fig. 3 is a detail of a horn-supporting bracket. Fig. 4 is a side view of a disk-machine with a horn supported in an upright position. Fig. 5 is a plan view of the disk thereof, showing diagrammatically the course of the stylus thereover. Fig. 6 is a front view of Fig. 4. Fig. 7 is a detail plan view of the universal support for the horn. Fig. 8 is a similar view showing the adjustable contacts. Figs. 9 and 10 are respectively side and plan views of said adjustable contacts. Fig. 11 is a detail of a flexible hollow coupling between a horn and sound-box. Fig. 12 is a detail of a tensional guide for a horn.

In Figs. 1, 2, and 3 I have illustrated my invention as applied to the support of a horn for a phonograph, and I will first describe the parts used in connection therewith. In said views the letter A indicates the case of the phonograph, B the frame which supports the cylindrical record C in the usual manner, and D the sound-magnifying horn. In order that the horn may be supported in an approximately upright position above the record and rendered capable of universal movement in a substantially horizontal plane at its lower end, I provide sustaining means as follows: E indicates a hollow post which extends upwardly from the frame B or from some other rigid portion of the apparatus. In the example indicated it is seen as entered within the boss *b* in place of the usual pivot used for the gate *b'* and for convenience serving the function of such

pivot. It may, however, be connected to a bracket, as b^2 , which can be conveniently attached to the frame B. Entered within the hollow post E is a rod e , that extends upwardly therefrom and is capable of adjustment vertically, whereby the height of said rod may be regulated. Projecting horizontally from said rod e at its upper end is a semicircular member e' , within which is pivotally mounted a ring e^2 , while an inner ring e^3 is pivoted within the ring e^2 , as seen. Sufficient clearance exists between the rings e^2 and e^3 and the semicircular support e' to permit said rings to swing vertically and independently. By this means an upright body supported within the inner ring is capable of universal movement, as is evident.

The assemblage of rings and their external pivotal supports referred to comprises what I term a "universal support," and it is disposed and held above the record substantially in the vertical line thereof, whereby when the horn, as D, is introduced within the inner ring e^3 it by means of an upper enlarged portion of the wall of said horn rests within said ring, and its lower contracted end, to which the sound-box F is attached, is held in suitable position with relation to the cylinder C, whereby the reproducing-stylus f , that extends from said sound-box, is in contact with the cylinder.

In order that horns of different sizes may be accommodated with and held by the support aforesaid, I place three or more bowed spring-like pieces e^4 at equidistant points within the ring e^3 , said pieces being secured at one end, as by rivets e^5 , and at their opposite ends having slots e^6 , by which they may slide upon studs e^7 . The tension of the pieces e^4 enables them to stand out to support a horn of relatively small diameter, while they may be contracted in receiving a larger horn.

As the stylus f travels from end to end of the cylinder C, it is necessary that means be provided permitting the stylus to maintain its contact with the cylinder when the horn is moved out of its upright position, because in such movement a rigid terminal point of the horn would describe an arc causing the stylus to leave the surface of the cylinder. Hence I have provided, as a connection between the horn and the sound-box, a flexible hollow coupling, as G, this coupling possessing the function of flexibility in a mechanical manner instead of as an inherent quality of the material employed. Thus I have shown the coupling G as composed of a corrugated or bellows-like tube of flexible material, whose wall is capable of expanding and contracting without stretch of the material of which the coupling is composed. Should an ordinary rubber tube be employed in place of this bellows device, the material thereof would contract at one side while expanding at its opposite side when swaying tangentially to its normal axis,

and the tension or resistance thereby set up would be imparted to the contact between the stylus and the cylinder, thereby interfering with the correct translation of the sound-vibrations in process.

In order to avoid the danger of interference with the quality of the sound-waves passing through the hollow coupling G through the presentation of the broken or corrugated surface of the bellows-like formation, I may provide a section of straight flexible tubing, as g , which is slidably inserted within said coupling, as seen, and which forms a passage having an unbroken wall while being capable of yielding in consonance with the movements given the bellows without exerting any dragging or retarding effect.

In adapting my improvements for use in conjunction with a disk-machine, wherein it is necessary to provide different means controlling the movement of the horn with relation to the record, because with this style of instrument the sound-box is carried by the horn, I have found it desirable to provide means while supporting the horn in an upright position to counterpoise the major part of the weight of the horn, thereby regulating to a nicety the degree of weight with which the reproducing-stylus bears against the disk. I have also found it necessary with this style of apparatus to provide means compensating for the undulatory movement of the disk while rotating to avoid changes in the degree of contact of the stylus with the record while the latter is moving under the former in the aforesaid undulatory or wave-like fashion.

I have, further, found it necessary to provide means enabling the reproducing-stylus, while moving radially with respect to the disk, to maintain an even contact therewith in describing the arc incident to the pivotal manner in which the horn is supported above the disk.

In carrying out these improvements I provide a hollow standard, as H, which is supported from the case as by a bracket-arm h or otherwise in a suitable manner and from which my aforesaid universal support extends horizontally. In this instance the universal support is connected with a slide, as h' , which is located within the hollow standard H, the latter acting as a slideway therefor. The slide h' is supported by a coiled spring h^2 , which is located within the hollow standard H and mounted upon a stop, as h^3 . A threaded stem h^4 , having a thumb-nut h^5 , serves to adjust the tension of the spring. In this manner the spring h^2 may be tensionally adjusted to the requisite degree for supporting the weight of the horn, which is mounted in the universal support aforesaid, thereby enabling the lower end of the horn having the sound-box I and stylus i to rest upon the disk J with just that degree of pressure which is desirable. A guide-arm K is pivotally connected

at one end to the standard H and at its opposite end is provided with a seat for the horn. By means of this guide-arm the oscillatory movement of the horn and reproducing-stylus with respect to the disk is limited to an arc concentric with the pivotal connection between the guide-arm K and the standard H. The course of the stylus in traversing the disk J is clearly shown in Fig. 5. When the needle is following this course, the horn, which is in a substantially upright position, the needle being at an outer point upon the disk, would sway upwardly, causing the stylus-point to leave the disk in describing an upward arc. Therefore I preferably incline the horn (somewhat in the manner indicated in dotted lines in Fig. 4) when the stylus is upon the starting or outer point upon the disk. Therefore as the horn sways, causing the stylus to travel inwardly, it also tends to assume a vertical position, (shown in full lines in Fig. 4,) this tendency enabling the stylus to maintain contact with the disk throughout its entire course across the disk.

In the practice of these instruments the disk J while rotating undulates or has a wavelike up-and-down motion. Hence if the horn were supported rigidly the stylus would exert pressure upon the disk with a varied degree of force in consequence of the presentation to it of the moving disk-surface in a series of different horizontal planes, or if this undulatory movement were excessive the disk-surface would intermittently make contact with and leave the point of the stylus. By reason of the tensional support given the horn, however, the stylus is thereby yieldingly supported upon the disk and is enabled to rise and fall with the corresponding undulatory movement of the disk in this rotation.

The arm K is pivoted, as at k' , to a collar k^2 , that is rotatably supported by the standard H, said arm K being tensionally supported in contact with the under side of the horn. This tensional support consists of a spiral spring k^3 , connected at one end with the upper surface of arm K near its fulcrum, and the other end of said spring being fastened to the bracket h or to some rigid point tangentially above the arm K in manner to exert an upward and sidewise tension to draw said arm (and with it the horn and stylus) toward the outer or starting point of the disk.

The sidewise tension referred to is of a moderate character, it being only required to swing the horn clear of the record on the disk when said horn has been moved to free the stylus from contact therewith, the main purpose of this exercise of spring tension being to prevent the horn from accidentally swinging inwardly when the instrument is not in use, as in such act the stylus might injure the record.

As before stated, the tension of the spring

k^3 may be varied, whereby said spring forms a cushion capable of exactly absorbing all foreign vibrations or jars, which would otherwise cause the stylus to rebound sharply and create a false sound.

As will be observed by a reference to Figs. 4 and 6, the horn there shown is connected with the sound-box without the intervention of any movable parts, and the sound-passage, starting from the diaphragm to the outlet, is devoid of sharp angles, all of which tend to break up the sound-waves and detract from that purity of emitted sound which is so desirable. In my improved apparatus aforesaid there is no joint in the passage, and but a single gradual curve exists in the lower end of the horn, near its point of connection with the sound-box. This peculiar construction is largely responsible in the attainment of the perfect results developed by this machine.

Having described my invention, I now declare that what I claim is—

1. In a phonograph or talking-machine, a frame therefor, a standard extending upwardly therefrom, a universal support extending horizontally from said standard, and a horn sustained in an upright position from said support.

2. In a phonograph or talking-machine, a frame therefor, a standard extending upwardly therefrom, a universal support extending horizontally from said standard, a tensional device between said standard and support, and a horn sustained in an upright position from said support.

3. In a phonograph or talking-machine, means sustaining the horn thereof in an upright position, said means comprising a number of concentric members, separately pivoted in manner to allow the universal movement of the horn horizontally.

4. In a phonograph or talking-machine, means pivotally supporting the horn thereof near its outer end, and a hollow connection between the contracted end of said horn and the sound-box, characterized by the ability to yield with the movement of the sound-box without exercising tension between the united members.

5. In a phonograph or talking-machine, means pivotally supporting the horn thereof near its outer end and a hollow, flexible, bellows-like connection between the horn and sound-box.

6. In a phonograph or talking-machine, means pivotally supporting the horn thereof near its outer end, a hollow, flexible, bellows-like connection between the horn and sound-box, and a straight flexible tube slidably fitted within said connection.

7. In a talking-machine, a vertically-disposed horn therefor having a sound-box at its contracted end, and tensionally-held means to guide said sound-box over the record.

8. In a talking-machine, a vertically-disposed horn therefor having a sound-box at its contracted end, tensionally-held means to guide said sound-box over the record, and tensional means to retract said sound-box when it has completed its traverse over the record.

9. In a talking-machine, a vertically-disposed horn therefor having its lower end curved laterally, and a sound-box attached

thereto, together with a guide-arm, pivoted to swing horizontally, and bearing tensionally against the under surface of said lower end of the horn, to guide the sound-box over the record.

VICTOR H. RAPKE.

Witnesses:

F. W. BARKER,
R. A. ETHERSON.

No. 807,862.

PATENTED DEC. 19, 1905.

F. P. PFLEGER.
INDICATOR.

APPLICATION FILED JULY 12, 1905.

FIG. 1

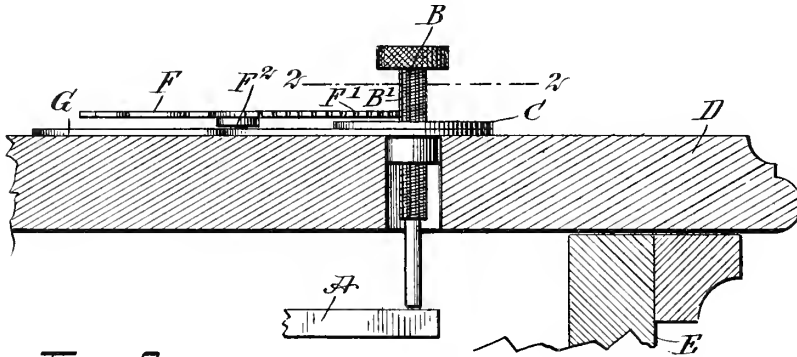
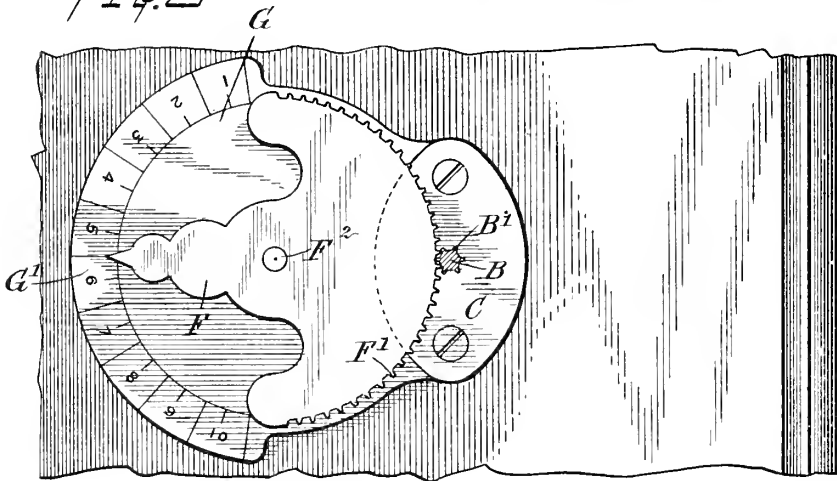


FIG. 2



WITNESSES:

John J. Miller
Rev. G. H. H. H. H.

INVENTOR

Frank P. Pfleger

BY *Munn*

ATTORNEYS

UNITED STATES PATENT OFFICE.

FRANK PAUL PFLEGER, OF EL PASO, TEXAS.

INDICATOR.

No. 807,862.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed July 12, 1905. Serial No. 269,294.

To all whom it may concern.

Be it known that I, FRANK PAUL PFLEGER, a citizen of the United States, and a resident of El Paso, in the county of El Paso and State of Texas, have invented a new and Improved Indicator, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved indicator more especially designed for use on phonographs, music-boxes, and like instruments and arranged to permit the user of the instrument to quickly adjust the speed-regulating device of the instrument according to the proper time in which a certain piece of music is to be performed.

The invention consists of novel features and parts and combinations of the same, which will be more fully described herein-after and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is a sectional side elevation of a phonograph provided with the improvement, and Fig. 2 is a sectional plan view of the same on the line 2 2 of Fig. 1.

The governor-bar A of a speed-regulating device of a phonograph, music-box, or like instrument is engaged by the usual regulating-screw B, screwing in a nut C, fixed to the cover D of the casing E of the instrument. When the operator turns the regulating-screw B, the governor-bar A is swung up or down, according to the direction in which the regulating-screw B is turned, and consequently the speed of the instrument is changed.

The regulating-screw B, as illustrated in Figs. 1 and 2, is provided, besides its usual screw-threads, with gear-teeth B' in mesh with a segmental gear-wheel F', forming part of a pointer F, mounted to turn at F² and indicating on a graduation G' on a dial G, secured to the cover D and preferably forming part of the nut C, as indicated in the drawings. Now it is evident that when the regulating-screw B is turned its gear-teeth B' cause the segmental gear-wheel F' to turn to move the pointer F along the graduation G',

which latter is preferably provided with graduation-marks numbered consecutively, as plainly shown in Fig. 2.

The time in which the piece of music is to be played is indicated on the record, and this time is preferably marked by a numeral corresponding to one of the numerals of the graduations G'. When the operator places the record in the machine, it is only necessary for him to turn the regulating-screw B until the pointer F indicates on the same numeral of the graduation G' which is marked on the record.

It is evident that the records may be marked and the graduation G' may be correspondingly arranged on the instrument by the manufacturers; but, if desired, the user of the instrument may mark the records according to the time and as indicated by the graduation G'. It is also evident that the graduation G' and the marks made on the records may be other than numerals as long as they correspond to cause the instrument to turn the record at the speed required for playing the piece of music according to the time in which it is written.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An indicator comprising a screw-rod having gear-teeth formed directly on the threaded portion thereof, a pointer mounted to swing and having segmental gear in mesh with the said screw-rod gear-teeth, and a dial on which indicates the pointer.

2. In an indicator of the character described, a screw-rod for operating the speed-regulating device of a phonograph or like instrument, said screw-rod having gear-teeth formed directly on the threaded portion thereof, a nut in which the screw-rod works, a dial formed integrally with the nut, and a pointer mounted on the dial and having a segmental gear meshing with the teeth of the screw-rod.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

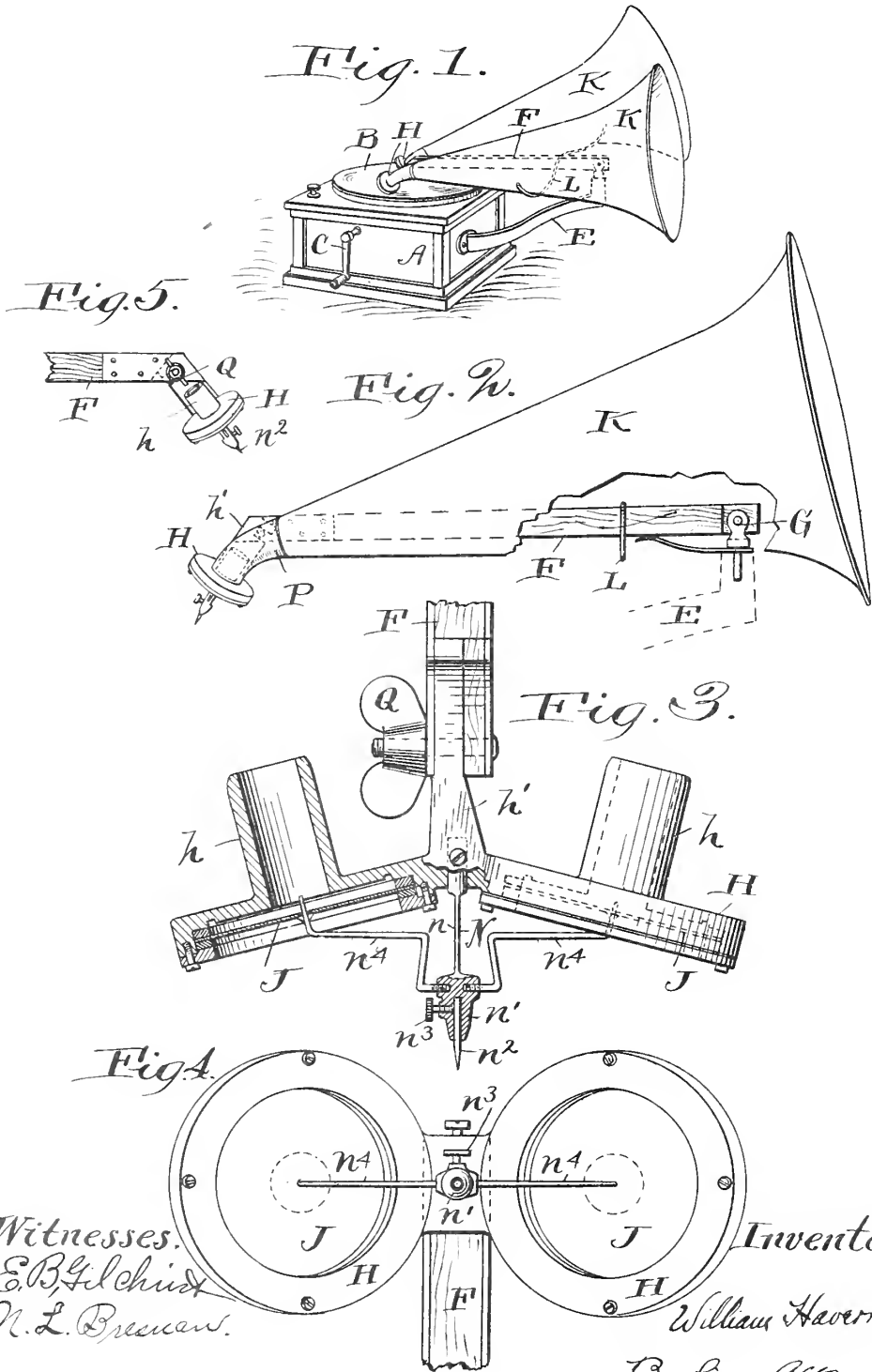
FRANK PAUL PFLEGER.

Witnesses:

GEORGE PENCE,
H. J. DARWOOD.



W. HAVERMAN.
PHONOGRAPH.
APPLICATION FILED MAY 15, 1905.



Witnesses:
E. B. Gilchrist
N. L. Brennan.

Inventor:
William Haverman,
By his Attorney,
Thurston & Bates.

UNITED STATES PATENT OFFICE.

WILLIAM HAVERMAN, OF CLEVELAND, OHIO.

PHONOGRAPH.

No. 806,806.

Specification of Letters Patent.

Patented Dec. 12, 1905.

Application filed May 15, 1905. Serial No. 260,390.

To all whom it may concern:

Be it known that I, WILLIAM HAVERMAN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Phonographs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide a phonograph which shall give a very large volume of sound and shall direct the sound to different parts of the room, so that the phonograph may better serve, for example, to entertain an audience or furnish music for dancing.

To this end I have devised a phonograph having a plurality of reproducers associated with a plurality of horns and all operating from a single stylus. By this means the volume of sound is very greatly increased and it may be directed to several points, as desired. The drawings clearly illustrate my invention.

Figure 1 is a perspective view of the phonograph complete. Fig. 2 is a side elevation of the reproducer, together with a horn and its support. Fig. 3 is a side elevation, partly cross-sectional, of my reproducer, having two reproducing-disks. Fig. 4 is a bottom view of the same. Fig. 5 is a view showing the attachment of the reproducer to the supporting-arm.

In the drawings, A represents the box of an ordinary phonograph, on the top of which is rotatably mounted the record, which may be a disk B. The usual crank C and other usual appurtenances may be mounted on the box. Carried by the box also is a supporting-bracket E. At the outer end of this bracket is pivoted an arm F, which at its inner end carries the reproducer. The arm F is pivoted in a clip or clevis which is swiveled in the support E.

The reproducer shown comprises a multiple sound-box H, carrying two diaphragms J and two exit-tubes h near the centers of these diaphragms. Two horns K rest near their outer ends on a yoke-piece L, carried by the arm F. The inner ends of these horns are connected with the tubes h by means of flexible elbows P.

Between the tubes h of the reproducer is a shank portion h' of the sound-box H, which may be movably held to the arm F by a thumb-nut Q, which clamps it into a fork carried by the arm. On the under side of this shank h'

is a recess in which is set and held a light bar N. This bar is of light enough construction to be bent out of its position slightly; but it is preferably not light enough to constitute a flexible leaf-spring in the ordinary sense. The bar N, as shown, is round where it is clamped in the opening, and beneath this it is flattened at n . Beneath the flattened portion the bar carries a head n' , into which is set the stylus-point n'' . The point is clamped in place by a set-screw n''' . Extending from the head n' to the centers of the two diaphragms J are pieces of metal n^4 , which may be of steel about the size of No. 16 or No. 18 wire. As shown, these two pieces of metal n^4 after leaving the head pass outwardly a short distance and then are bent toward the disks and then are turned across them and finally near their ends are turned upward to the diaphragms and suitably secured thereto. This course of these connecting-rods n^4 has been found in practice to be very efficient; but some other shape may answer as well.

By means of two disks the vibration of the stylus-point is caused to produce twice as much sound, and by having two horns this sound is employed to better advantage, since it is directed over a greater area. I do not intend to limit myself herein to the employment of just two reproducers and horns or the exact arrangement of parts shown, for it is evident that by a simple extension of my mechanism the single stylus could be made to vibrate more than two diaphragms, the sound of which could be carried by a corresponding number of horns. Changes in construction and mechanical modifications will also occur to those skilled in this art, and these are included within my invention.

Having thus described my invention, I claim—

1. In a phonograph, the combination, with means for rotating the record, of a pair of reproducers, a common stylus for both the reproducers, a pair of horns corresponding to the two reproducers, and a pivoted arm carrying the reproducers and supporting the horns.

2. In a phonograph, in combination, a reproducer comprising a multiple sound-box and a plurality of diaphragms carried thereby, tubular extensions on the sound-box above the diaphragms, a stylus carried by the sound-box between the diaphragms, a connection from the stylus to the under sides of the various diaphragms, a shank for said sound-box, a pivoted supporting-arm to which said shank is

secured, a support on said arm for horns, and a plurality of horns resting on said support and connected at their small ends with the tubular extensions of the sound-box.

5 3. In a phonograph, in combination, a pivoted arm, a multiple sound-box removably clamped to the forward end of the arm, a plurality of diaphragms for said sound-box, a stylus-support projecting downward from the
10 sound-box between the diaphragms thereof,

a connection leading from such support to the center of each diaphragm, and a stylus carried by the support.

In testimony whereof I hereunto affix my signature in the presence of two witnesses. 15

WILLIAM HAVERMAN.

Witnesses:

ALBERT H. BATES,
N. L. BRESNAU.

No. 808,052.

PATENTED DEC. 19, 1905.

D. HIGHAM.
PHONIC APPARATUS.
APPLICATION FILED JUNE 6, 1905.

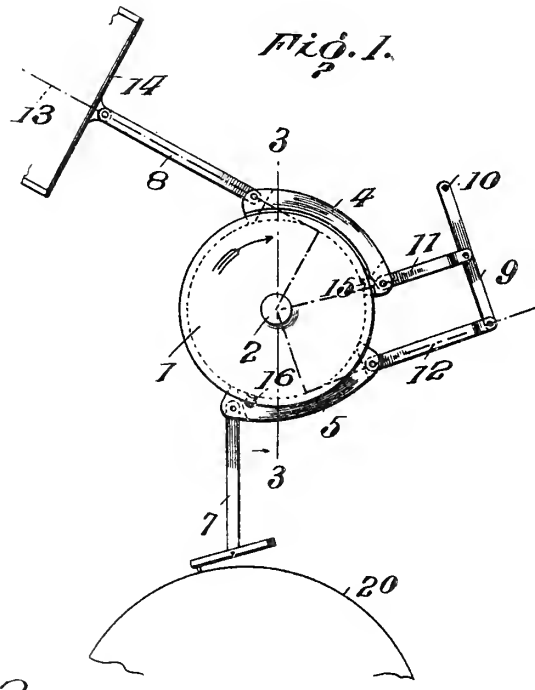


Fig. 2.

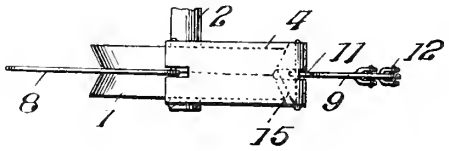


Fig. 3.

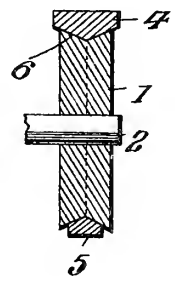


Fig. 5.

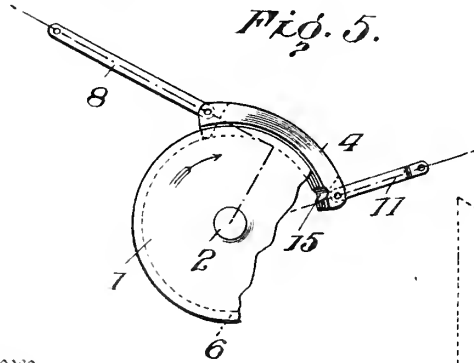
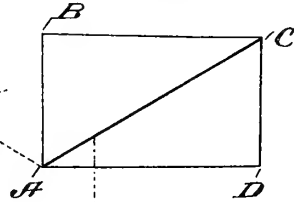


Fig. 4.



Witnesses

Wm B. Merham
Gustave P. Thompson

Inventor

Daniel Higham

Wm. Cameron Lewis
Attorney

UNITED STATES PATENT OFFICE.

DANIEL HIGHAM, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO
HIGHAMOPHONE COMPANY, OF JERSEY CITY, NEW JERSEY, A
CORPORATION OF NEW JERSEY.

PHONIC APPARATUS.

No. 808,052.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed June 5, 1905. Serial No. 263,863.

To all whom it may concern:

Be it known that I, DANIEL HIGHAM, of Bridgeport, Connecticut, have invented a new and useful Improvement in Phonic Apparatus, which invention is fully set forth in the following specification.

This invention relates to phonic apparatus employing an intermediate friction mechanism between a primary and a secondary vibrating means, such as shown in my United States Patent No. 678,576, of July 16, 1901, and in my allowed United States application filed December 12, 1904, Serial No. 236,609.

In apparatus of the character indicated it has been found that under certain conditions there is a disagreeable squeaking noise resulting from the action of the friction-shoe upon the revolving friction device which tends to a greater or less extent to detract from the perfection of the operation of the apparatus, and particularly is this true when the apparatus is one employed in the reproduction of recorded sounds. In practice one of the preferred forms of friction apparatus consists of a revolving friction-roll having a peripheral V-shaped groove, in which groove there rests a friction-shoe having surfaces contacting with the sides of the V-shaped groove. I have discovered that when the friction-shoe bears evenly and uniformly upon the opposing surfaces of the V-shaped groove the squeaking noises are much diminished, but that when for any reason the friction between the shoe and one side of the groove is increased over that of the friction between the shoe and the other side of the groove the squeaking is much increased. This increase may be caused by the presence of particles of grit or dust upon the friction device or may be due to the lack of uniformity in the composition of the material constituting the friction-roll or the manner in which the friction-shoe is held on the roll. The tendency of the friction-shoe to ride up on one side of the groove results in a side-to-side movement of the friction-shoe in the groove and the production of objectionable noises.

The object of the present invention is to produce a friction device for use in apparatus of the character mentioned which shall be so constructed as to avoid the objectionable noises referred to. I have discovered that if the angle of inclination of the sides of the V-

shaped groove is given a certain determined relation to the coefficient of friction between the shoe and the material constituting the friction-roll this side-to-side movement of the shoe will be avoided and the noises resulting therefrom avoided. Generally stated, the angle of inclination of the sides of the V-shaped groove should be one whose tangent is approximately equal to the coefficient of friction existing between the shoe and the material constituting the friction-roll. I have also found that by giving the link which receives the pull of the shoe a proper position or inclination the said noises may be further diminished, while a still further diminution is obtained by an escape pocket or outlet for dust that accumulates between the shoe and friction-roll. It is also beneficial to make one shoe-section of the compound shoe slightly wider than the friction-roll and one slightly narrower.

The invention will be best understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of friction-wheel and jointed friction-shoe in operative position. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a vertical section of Fig. 1 on the line 3 3 of said figure. Fig. 4 is a diagrammatic view serving to illustrate one part of the invention, and Fig. 5 is a broken detail.

Referring to the figures of the drawings, 1 is a friction-roll of suitable material, as amber, revolved in the direction of the arrow by means of a shaft 2, driven from any suitable source of power. (Not shown.) The shoe, here shown as in two sections 4 and 5, rests in the V-shaped groove 6 and has one of its members 5 in operative relation, through the link 7, with the primary vibratory means 20 and its other member in operative relation, through the link 8, with the secondary vibratory means 14.

The two sections 4 and 5 of the friction-shoe are flexibly connected together in the following manner: A lever 9, fulcrumed at 10, is connected to the rear end of shoe-section 4 by a link 11, pivotally joined to the shoe-section 4 and to the lever 9, while a link 12 is also pivotally connected to the lever 9 and the forward end of shoe-section 5, the link 11 being preferably shorter than link 12 and being also connected to the lever 9 at

a point nearer the fulcrum 10 than is the link 12. By connecting the shoe-sections in this way comparatively short sections, each somewhat less than one-third of the circumference of the friction-roll 1, may be employed without decreasing the volume of the reproduced sounds. Furthermore, there is a great tendency for the different portions of a long extended shoe composed of two parts connected by a simple link to synchronize and set up squeaking sounds which lend an unnatural tone to the reproduction, and by indirectly connecting the sections in the manner indicated one of the shoe-sections has a slightly greater amplitude of vibration than the other, and this tendency to synchronization is avoided. It has also been found that with this construction the coefficient of friction at the friction-surface need not be so high to secure the desired volume of the reproduced sounds, and the tendency to squeaking is further reduced for this reason.

It has been found best to have the links 8 occupy such a position with respect to the shoe-sections 4 that a line 13 drawn through the point where said link is connected to the shoe-section and through the point where it is attached to the secondary vibrating member 14 will be tangent to the bottom of the V-groove 6 at a point approximately midway between the ends of said shoe-section. By thus arranging the parts the squeaking noise is reduced to a minimum. The same relation is maintained between the link 12 and its shoe-section 5.

In some cases the material, as amber, of which the friction-roll is composed, has fine particles of dust rubbed up by the action of the shoe on the roll, and this dust is liable to and does collect near the rear end of the shoe-sections and unless provision is made to avoid it gives rise to squeaking noises of the character mentioned. For the purpose of eliminating the squeaking due to this cause each of the shoe-sections 4 and 5 is slightly cut away at the rear end of the friction-face thereof, as indicated at 15 and 16. (See Figs. 1 and 5.) By "rear" end of the shoe-sections is meant that end where the friction-roll passes from under the shoe-section. This cut-away part is preferably located just in front of a line drawn through the pivot-points of the link 11 for shoe-section 4 and link 7 for shoe-section 5, as indicated in Fig. 5, though, if desired, it may be just in front of a radial line passing through the center of the roll and the point where the link 11 is connected to the shoe-section 4 or the link 7 to the shoe-section 5, as shown in Fig. 1. This cut-away space in the shoe-sections affords a place of lodgment for the dust where it will not interfere with or modify the character of the friction between the shoe and roll, and hence eliminates the squeaks due to this cause.

It has been found that by inclining the sides of the V-shaped groove 6 at a proper angle a squeak which sometimes takes place at the rear end of the friction-shoe may be eliminated. This squeak is due to a side-to-side vibration of the rear end of the shoe, caused by the tendency of the shoe to ride up one incline or the other. I have found that this is avoided by making the incline steep enough so that the shoe cannot be sustained upon the incline. Too steep an incline, however, is detrimental to sensitive action of the shoe, and it is therefore important to have the incline only sufficiently steep to overcome this tendency. The correct angle bears a certain relation to the coefficient of friction at the friction contact between the shoe and roll and can be readily obtained in the manner shown in Fig. 4, in which the dotted lines represent a portion of the outline of a friction-roller of any suitable material, as of amber. Let A B be a line drawn from the bottom of the V-shaped groove perpendicular to the axis of the friction-roll and B C a line perpendicular to the line A B at B, the length of A B being in proportion to the length of B C as the coefficient of friction between the shoe and the roller is to one—that is, assuming, for example, that the coefficient of friction between the shoe and the material constituting the roll is .60 then the length of the line A B is .60 of the length of the line B C. Connect points A and C by the line A C. The angle of inclination of the line A C will be the desired angle of inclination of the sides of the V-shaped groove. Draw the line A D parallel to B C and drop the line C D perpendicular to A D. Then the line C D will be the tangent of the angle C A D, which is the angle of inclination of the sides of the V-shaped groove. Now since the line A B represents the coefficient of friction between the shoe and the roll and the line C D is the tangent of the angle of inclination it will be seen that the coefficient of friction existing between the shoe and the roll is equal to the tangent of the angle of inclination of the sides of the groove.

While theoretically the tangent of the angle of inclination should be equal to the coefficient of friction between the shoe and the roll, it will be understood, of course, that in practice this relation may be slightly departed from, it being only essential that approximately the relation specified should exist. It will also be understood that with the employment of different substances for the friction-roll or the shoe, or both, different coefficients of friction would exist and that there would therefore necessarily result a different angle of inclination for the sides of the groove.

In friction apparatus of this character it has been heretofore proposed to use a sectional shoe with the links thereof suitably connected together, and I have found that the best results are secured by having the section

of the shoe which is connected to the primary vibrating element somewhat narrower than the V-shaped groove in the friction-roll, while the shoe-section connected to the secondary vibrating element should be wider than the V-shaped groove in the friction-roll. By this means, and particularly in the case of the shoe-section which is wider, I avoid the squeaking noises which result from the rubbing of the sharp edges together. This construction is clearly illustrated in Figs. 2 and 3 and need not be further described.

By combining a friction-roll having a V-shaped groove whose faces are inclined at the proper angle, as hereinbefore described, with a sectional friction-shoe, one at least of whose elements is broader than the V-shaped groove and by indirectly connecting the sections of the friction-shoe together in the manner herein indicated, and having the links which extend from the forward end of the shoe-sections lying approximately in a line tangent to the friction-roll at or about a point midway of the respective sections and employing the cut-away pockets adjacent to the rear ends of the sections, as herein described, I have found it possible to very largely eliminate the objectionable squeaking noises referred to.

What is claimed is—

1. In a phonic apparatus employing friction in the manner described, a friction-roller having inclined surfaces, a friction-shoe contacting with and guided by said surfaces, the tangent of the angle of inclination of said surfaces being approximately equal to the coefficient of friction between said shoe and roller when said coefficient is expressed in terms of the angle.

2. In a phonic apparatus employing friction in the manner described, a friction-roller having a peripheral V-shaped groove and a friction-shoe having bearing in said groove, the sides of the V-shaped groove having an angle of inclination whose tangent is approximately equal to the coefficient of friction when said friction is expressed in terms of the angle.

3. In a phonic apparatus employing friction in the manner described, a friction-roller having inclined surfaces, a friction-shoe contacting with said surfaces, the angle of inclination of each of said surfaces being equal to the acute angle at the base of a right-angle triangle whose altitude bears the same relation to its base that the coefficient of friction between the roller and shoe does to one.

4. In a phonic apparatus employing friction in the manner described, a friction-roller having a V-shaped groove in its periphery, a friction-shoe having bearing in said groove, the angle of inclination of the sides of said groove being equal to the acute angle at the base of a right-angle triangle whose altitude bears the same relation to its base that the

coefficient of friction between the roller and shoe does to one.

5. In a phonic apparatus, the combination of a friction-roller having a peripheral groove, a friction-shoe bearing in said groove, a portion of said shoe being broader than said groove, and primary and secondary vibrating elements in operative relation with said shoe.

6. In a phonic apparatus, the combination of a friction-roll having a peripheral groove, a sectional friction-shoe bearing in said groove one of the sections of said shoe being broader than said groove and one narrower, and primary and secondary vibrating elements in operative relation with said shoe.

7. In a phonic apparatus, the combination of a friction-roller, a friction-shoe bearing thereon, said shoe having a cut-away space or dust-pocket formed in its friction-face and primary and secondary vibrating elements in operative relation with said shoe.

8. In a phonic apparatus, the combination of a friction-roller, a sectional friction-shoe bearing thereon, a flexible connection between the shoe-sections, said connection consisting of a suitably-fulcrumed lever with links pivotally connected thereto and to the shoe-sections, and primary and secondary vibrating elements in operative relation with said shoe.

9. In a phonic apparatus, the combination of primary and secondary vibrating elements, a friction-roller, a friction-shoe section bearing on said roller and having its rear end in operative relation with said primary vibrating element, a second friction-shoe section bearing on said roller and having its front end in operative relation with the secondary vibrating element, a lever fulcrumed in proximity to the adjacent ends of said shoe-sections, and link connections between said lever and the adjacent ends of said shoe-sections.

10. In a phonic apparatus, a friction-roller, a sectional friction-shoe bearing thereon, a primary vibrating element in operative relation with one end of said shoe, a secondary vibrating element, and a flexible connection between said secondary element and the other end of said shoe, said connection extending approximately along a line tangent to the friction-roller at a point approximately midway of the length of the shoe-section to which it is connected.

11. In a phonic apparatus, the combination of a primary and a secondary vibrating element, a friction-roller, a sectional friction-shoe bearing on said roller, a link connection between the front end of one shoe-section and said secondary vibrating element, said link connection extending along a line approximately tangent to said friction-roller at a point substantially midway between the ends of said shoe-section, a lever pivoted in proximity to the adjacent ends of the shoe-sections

tions, links connecting said lever to said shoe-
sections, the link connected to the rear shoe-
section extending along a line approximately
5 midway between the ends of said section, and
operative connections between the primary
vibrating element and said last-named shoe-
section.

In testimony whereof I have signed this
specification in the presence of two subscrib- 10
ing witnesses.

DANIEL HIGHAM.

Witnesses:
A. B. KEOUGH,
C. A. GIBNER.

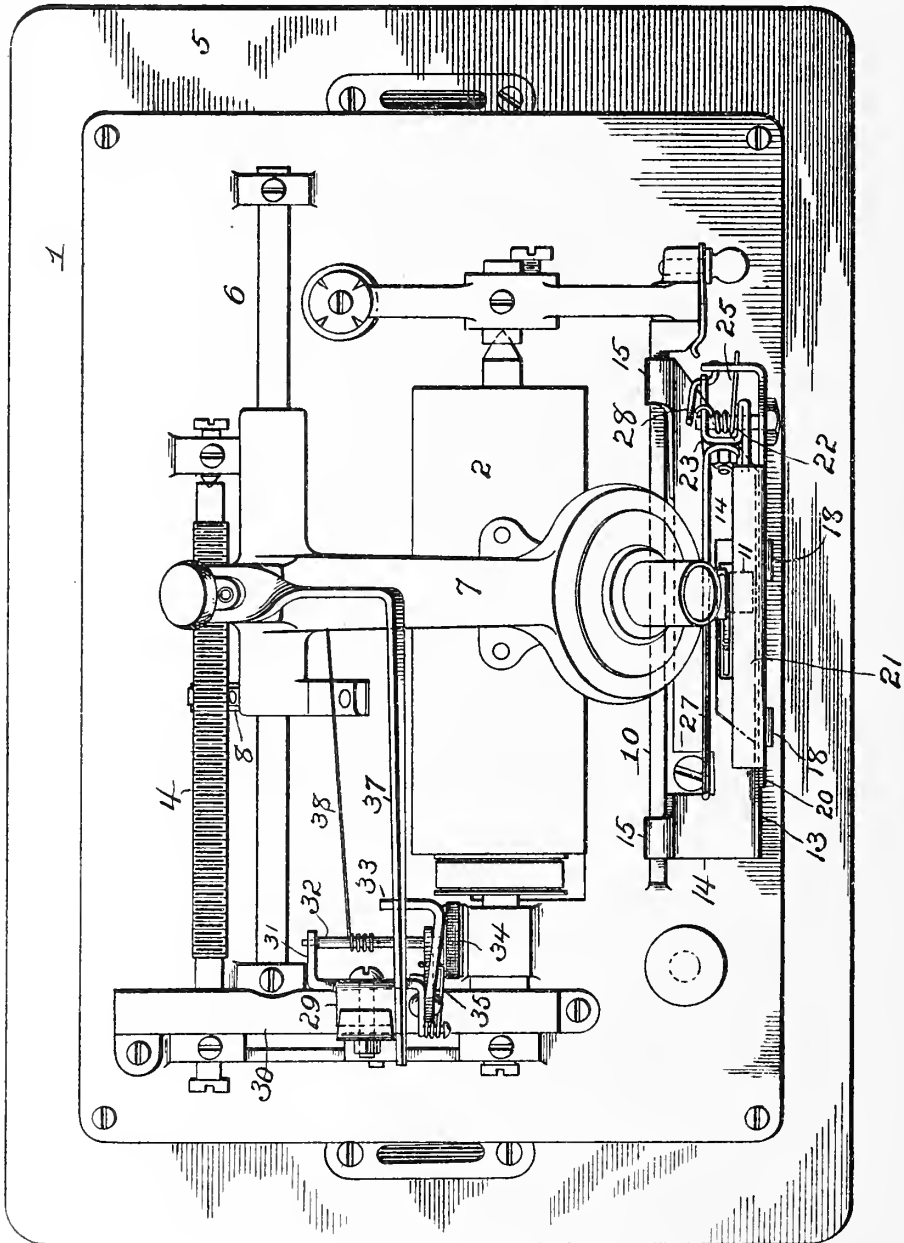
No. 808,387.

PATENTED DEC. 26, 1905.

C. J. KURTZ.
REPEATING MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED JAN. 14, 1905.

3 SHEETS—SHEET 1.



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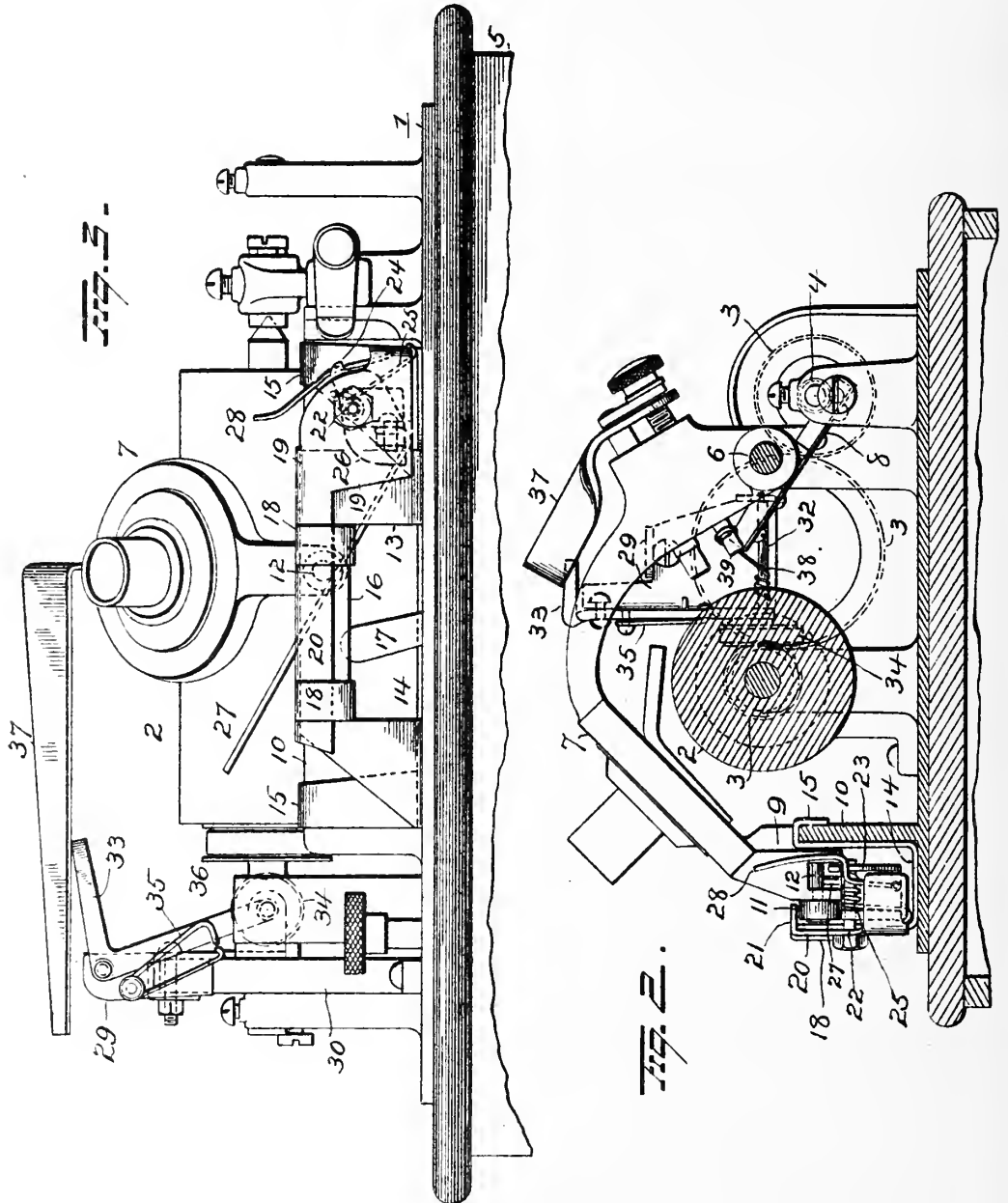
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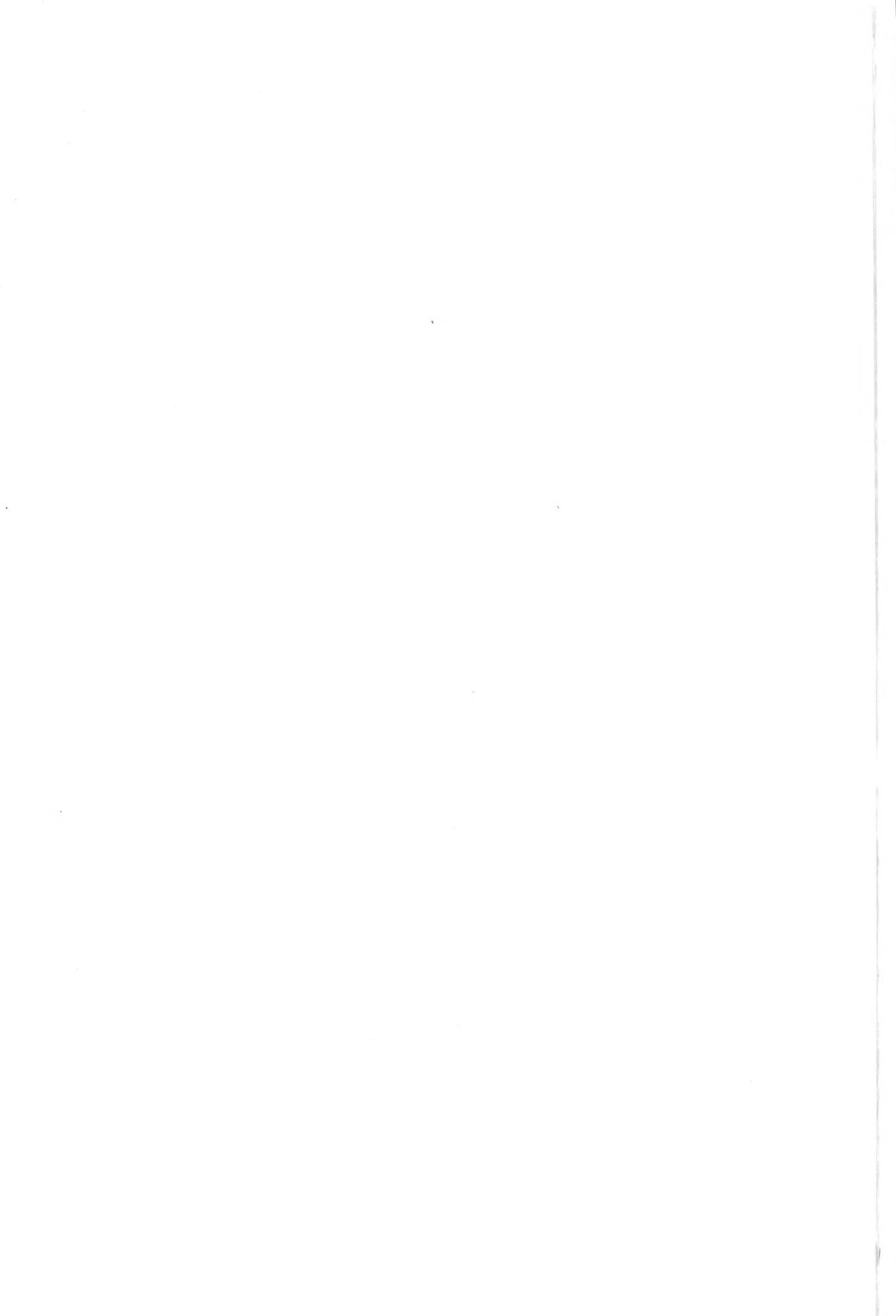


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3 SHEETS—SHEET 3.

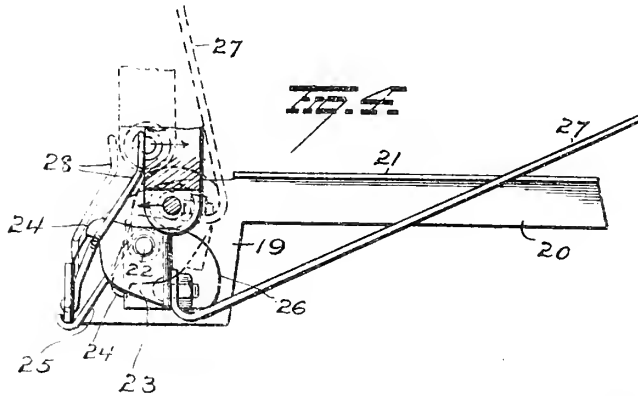


Fig. 4.

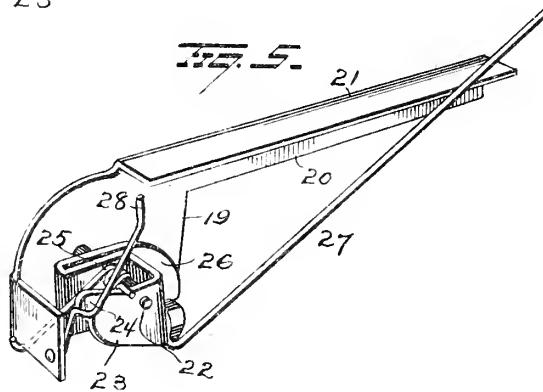
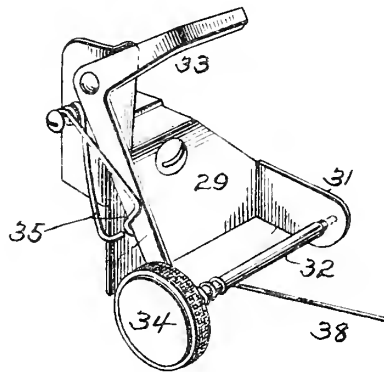


Fig. 5.



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UNITED STATES PATENT OFFICE.

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REPEATING MECHANISM FOR PHONOGRAPHS.

No. 808,387.

Specification of Letters Patent.

Patented Dec. 26, 1905.

Application filed January 14, 1905. Serial No. 241,081.

To all whom it may concern:

Be it known that I, CLINTON J. KURTZ, a resident of Salem, in the county of Marion and State of Oregon, have invented certain new and useful Improvements in Repeating Mechanism for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved repeating mechanism for phonographs and the like, the object of the invention being to provide improved means which will compel the reproducer to automatically return to the starting end of a record and continuously repeat the same record until the apparatus is stopped or runs down.

With this object in view the invention consists in certain novel features of construction and combinations and arrangements of parts, as will be more fully hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view illustrating my improvements. Fig. 2 is an end view, partly in section. Fig. 3 is a front elevation, and Figs. 4, 5, and 6 are enlarged views of details of construction.

1 represents the main supporting-plate, and 2 is the well-known form of rotary record-carrying cylinder turned by gearing 3, which also turns the feed-screw 4 at one side, and said gearing is driven by any suitable form of motor in the box 5, on which the plate 1 and mechanism are supported.

6 is a rod on which the sliding reproducer-frame 7 is hinged, and said frame at one side of rod 6 is provided with an arm 8, having a finger or fingers to engage the screw 4 and feed the reproducer-frame along. The other end of the reproducer-frame 7 has a lug 9, sliding on a guide-bar 10, and carries at its free end a roller 11, the pintle 12 of which projects through the bifurcated lower end of frame 7.

My improved guide-frame attachment 13 comprises a sheet-metal frame having its base portion 14 resting on bed-plate 1, and clamping-tongues 15 are provided at one side at the ends to clamp over the bar 10 and securely hold the frame in position. At the other edge of the base portion 14 a vertical plate 16 is provided and cut away at its center to

give free access to the starting and stopping lever 17. Clamping-tongues 18 are provided on the outside of plate 16 at its upper portion and are adapted to clamp and adjustably secure in position a frame 19, comprising the horizontal straight portion 20, having a lateral flange 21, forming a guide bar or track for the return movement of roller 11, as will more fully hereinafter appear. A laterally-projecting bolt 22 is secured in the end of frame 19, and a lifting and tripping dog 23 is pivotally secured on the bolt 22. This dog comprises a bowed strip of metal perforated at its ends to receive the bolt and one end having a tooth or shoulder 24, and a spring-wire 25 is coiled around bolt 22, bears at one end beneath frame 19, and at its other end bears against dog 23, normally tending to throw the same to an approximately vertical position and move a curved tongue 26, secured to one side thereof, up to the track 21. A rod 27 is secured to dog 23 and is adapted to be held down by the reproducer-frame and hold the dog and tongue 26 depressed, and when in this position a spring-catch 28, secured to frame 19, holds the dog 23 in set position, as the spring-catch 28 has a shoulder formed between its ends to engage the tooth or shoulder 24 until released by the reproducer-frame moving against the upper end of the spring-catch.

A bracket 29 is secured to the gear-casing 30 at one end of the device and is provided at one end with an arm 31, having an opening which affords a bearing for one end of a shaft 32, the other end of said shaft being supported in the end of a bell-crank lever 33. A friction-roller 34 is secured on the shaft 32, and a spring 35, bearing against the lever 33, presses the roller 34 against the drive-pulley 36 at the end of cylinder 2; but a long arm 37 is secured to the reproducer-frame, and when the latter is moving along and reproducing the record this arm 37 will depress the lever 33 and hold the roller 34 out of operation. When the reproducer-frame reaches the end of its movement and is elevated by the dog 23, as will be hereinafter pointed out, the arm 37 will move away from the lever 33 and permit spring 35 to hold the roller 34 in contact with the drive-pulley 36, so as to be driven thereby. A string 38 is secured at one end to a pin 39 on the reproducer-frame and at its

other end to shaft 32, so that when the latter is turned by roller 34 the cord will be wound on the shaft and the reproducer-frame moved back to its starting-point.

5 The operation of my improvements is as follows: As the reproducer-frame is moved along the record the roller 11 moves below track 21 and the arm 37 depresses lever 33 and holds the roller 34 out of operation, permitting the cord 38 to unwind from shaft 32 as the reproducer-frame moves along. When the reproducer-frame reaches the end of the record, the roller 11 will move beyond the track 21, and the reproducer-frame will push the spring-catch 28 out of contact with the shoulder or tooth 24, and the spring 24 will throw the dog to an upright position. The curved tongue 26 will engage the roller 11 and elevate the same and the reproducer-frame, lifting the reproducer out of contact with the record. This lifting also moves the arm 37 out of engagement with the lever 33, and the spring 35 moves the roller 34 against the drive-pulley 36. The rotation of the latter then drives roller 34 and shaft 32, winding cord 38 thereon and pulling the reproducer-frame back to its starting-point. As the reproducer-frame moves back to its starting-point the roller 11 will run on track 21 and hold the reproducer out of contact with the record and also hold the fingers of arm 8 out of engagement with feed-screw 4, and the reproducer-frame will force the rod 27 downward and set the dog 23. When the reproducer-frame reaches its starting-point, roller 11 will fall from the end of track 21, permitting the arm 8 to engage feed-screw 4, and arm 37 will throw roller 34 out of contact with the pulley 36, and the operation above described is repeated indefinitely or until the motor gives out.

It will be seen that with my improvements the parts can be adjusted to suit varying lengths of record, and slight changes in the form of the attachments can be made to fit other forms of phonograph, and hence I do not restrict myself to the precise details set forth, but consider myself at liberty to make such slight changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

55 1. In an apparatus of the character described, the combination with a movable reproducer-frame, of means for lifting the reproducer-frame when at the end of the record and move it out of engagement with its driving mechanism, a track to guide the return of the reproducer-frame in its elevated position, a friction-roller normally held out of operation by mechanism on the reproducing-frame, and a spring adapted when the reproducer-frame is elevated, to move the friction-roller into opera-

tion to move the reproducer-frame back to its starting-point.

2. In an apparatus of the character described, the combination with a movable reproducer-frame, of means for lifting the reproducer-frame when at the end of the record and move it out of engagement with its driving mechanism, a track to guide the return of the reproducer-frame in its elevated position, a returning mechanism, means normally tending to throw the returning mechanism into operation, an arm on the reproducer-frame normally holding the return mechanism out of operation when the reproducer-frame is in its operative position and releasing the returning mechanism and permitting it to operate when the reproducer-frame is elevated.

3. The combination with a phonograph, of a shaft, a cord connecting the shaft with the reproducer-frame, a friction-roller on the shaft, a lever connected with the shaft, a spring bearing against the lever and normally pressing the friction-roller into engagement with the cylinder-drive pulley, an arm on the reproducer-frame engaging the lever and holding the roller out of operation when the reproducer-frame is moving in one direction and reproducing the record, means for elevating the reproducer-frame at its end of movement permitting the roller to operate and wind the cord on the shaft and pull the reproducer-frame back to its starting-point, and a track guiding the return of the reproducer-frame in an elevated position.

4. The combination with a phonograph, of a roller on one end of the reproducer-frame, a frame, comprising two members adjustably secured together, a track on one of said members beneath which track the roller moves in one direction, a tripping and elevating dog mounted on one end of the frame, a spring constructed to throw the dog to elevate the roller to a level with the top of the track, a spring-catch holding the dog in set position until released by the reproducer-frame, means for drawing the reproducer-frame back to its starting-point with the roller moving along the top of the track, and a rod on the dog disposed under and moved by the reproducer-frame in its returning movement to set the dog.

5. An attachment for phonographs, comprising means for elevating the reproducer-frame when the latter is at the end of its movement, a track to guide the return of the reproducer-frame and hold it elevated, a shaft, a cord connecting the shaft with the reproducer-frame, a roller on said shaft, means on the reproducer for holding the roller out of operation when the frame is moving in one direction and releasing the same when the frame is elevated, permitting the cord to be wound on the shaft and the frame drawn back to its starting-point.

6. An attachment for phonographs, compris-

ing means for drawing the reproducer-frame
back to its starting-point, a spring normally
tending to throw said means into operation,
means for elevating the frame when at the
5 end of its forward movement, means for guid-
ing the frame back to its starting-point and
holding it elevated, and means on the repro-
ducer-frame normally engaging the returning
mechanism and holding it out of operation

while the reproducer is moving in a direction 10
to reproduce the record.

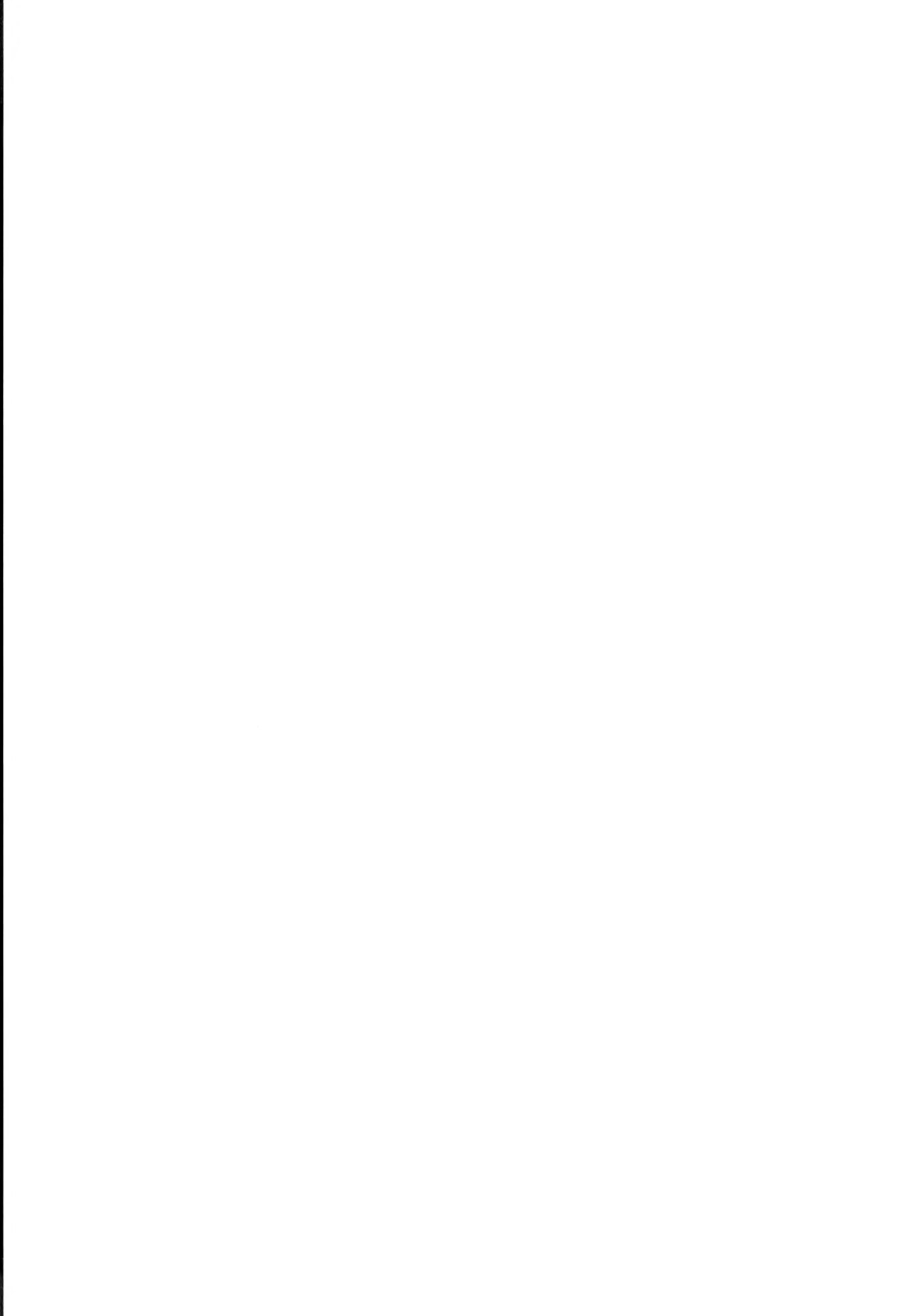
In testimony whereof I have signed this
specification in the presence of two subscrib-
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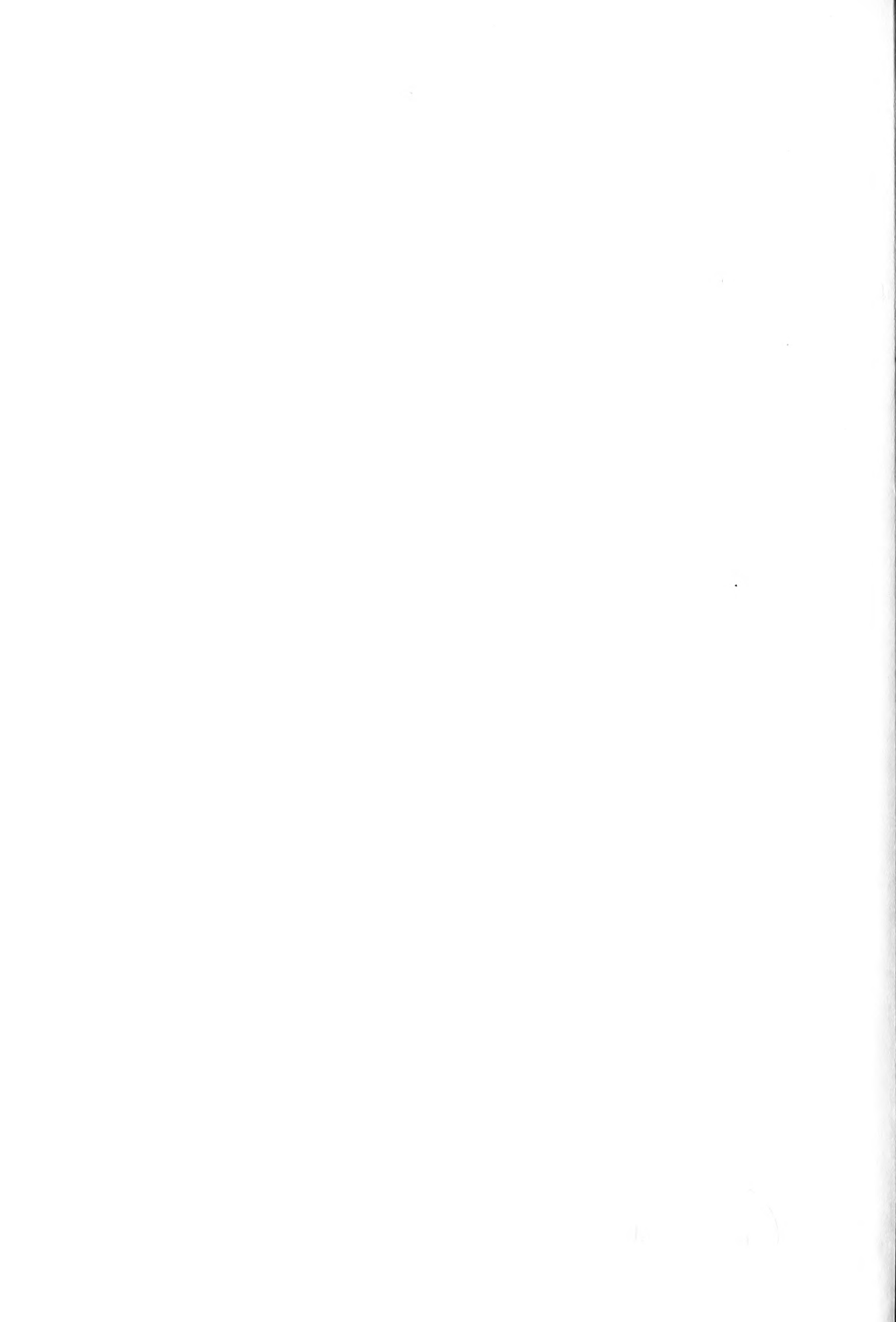
CLINTON J. KURTZ.

Witnesses:

A. O. CONDIT,
RAY SMITH.









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